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*Reading for Understanding:
Towards an R&D Program
in Reading Comprehension*

*RAND Reading Study Group
Catherine Snow, Chair*

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DRAFT

- ii -

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DRAFT

- iii -

PREFACE

In the fall 1999, the Department of Education's Office of Educational Research and Improvement (OERI) asked RAND to examine ways in which OERI might improve the quality and relevance of the education research funded by the agency. As part of this work, RAND convened two study groups in the areas of reading and mathematics education to develop long-term programs of research in the two respective fields. This report is the initial draft of the RAND Reading Study Group (RRSG), which sets forth a framework for a program of research in reading comprehension. We hope it will be the starting point for a major discussion among researchers, practitioners, and policy makers of needed R&D related to reading comprehension.

This report is the product of initial deliberations of the RRSG – 14 experts representing a range of disciplinary and methodological perspectives on the field of reading. The positions of the study group report must be tested in discussion, debate, and ultimately in research and practice. The report, as amended by the comments from the field and further deliberations of the study group is intended to be used by OERI staff in developing solicitations for a major program of research, in reading.

To promote the building of active research and practice communities, the study group reports will be distributed widely. This draft report will be made available on a public website (www.rand.org/multi/achievementforall) along with external reviews from eight experts in reading research and practice. The website will allow visitors to comment directly on the report and to participate in discussions around key issues in the reading field. In addition, the report will be presented and discussed at all appropriate professional meetings. The RRSG will use the input collected to create a revised version of this report in late-summer 2001. We anticipate that the report will be a "living document" that is regularly revised over the course of the program.

The RAND project will produce a comparable report in the area of mathematics education research, prepared by a RAND Mathematics Study Group. In addition, RAND will prepare a report documenting lessons learned in using study groups to develop programs of research and outlining the supports needed to successfully continue these programs and develop new programs of research.

Funding for this research was provided under a contract with OERI and was carried out under the auspices of RAND Education and the Science and Technology Policy Institute (S&TPI), a federally funded research and development center sponsored by the National Science

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DRAFT

- iv -

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DRAFT

- v -

CONTENTS

RAND Reading Study Group (RRSG).....	ii
Preface	iii
Contents	v
Figures.....	vii
1.0 INTRODUCTION.....	1
1.1 Issues Motivating this Report.....	3
1.2 What We Know.....	6
1.3 Defining Reading Comprehension	7
1.4 Components	10
1.5 Outcomes	17
1.6 Reader Differences	18
2.0 THE RESEARCH AGENDA: IMPLICATIONS OF THIS MODEL OF READING COMPREHENSION	24
2.1 Assessment.....	24
2.2 The Development of Automated Reading Assessment Systems	26
2.3 Instruction.....	26
2.4 Comprehension Instruction	27
2.5 Content Area Instruction	28
2.6 Instructional Responses to Diversity	28
2.7 Sources of Poor Reading Comprehension	29
2.8 Teacher Education, Professional Growth, and Institutional Structures and Policies	31
3.0 STRATEGIES FOR DEVELOPING A RESEARCH PROGRAM ON READING COMPREHENSION	32
3.1 Prerequisites to Establishing a Research Program	32
3.2 The OERI Infrastructure	34
3.3 Methods Appropriate to the Task: Research Methodologies.....	35

DRAFT – Released for Discussion Purposes Only

DRAFT

- vi -

3.4 Procedures for Establishing Research Priorities.....	37
3.5 Next Steps.....	42
APPENDIX A: Criteria for a Comprehensive and Theoretically Grounded Assessment System.....	44
APPENDIX B: Bibliographic Resources.....	46
APPENDIX C: Research Questions Categorized by Topic.....	47
ASSESSMENT.....	47
INSTRUCTION.....	47
Instructional Variables	50
SOURCE OF POOR READING COMPREHENSION	50
Text Characteristics	51
Learner Characteristics.....	51
Social, Interpersonal, and Interactional Variables	51
TEACHER EDUCATION & PROFESSIONAL GROWTH.....	52
INSTITUTIONAL STRUCTURES & POLICY	53
School Organization and Policy Variables	53
APPENDIX D: Research Questions Generated at Breckenridge, Colorado Meeting in August 2000	54
Definition and Classification.....	61
Text Characteristics	62
Learner Characteristics.....	62
School Organization and Policy Variables	65
APPENDIX E: RAND Reading Study Group CAMEOS	66

DRAFT

- vii -

FIGURES

Figure 1. Dimensions of Reading Comprehension	9
Figure 2. Knowledge Base/Teaching Practice Grid	39
Figure 3. Knowledge Base/Teaching Practice Cube	40

DRAFT

-1-

INTRODUCTION

This draft report from the Rand Reading Study Group (RRSG)¹ formulates an initial proposal concerning the research issues that the community of reading researchers most urgently needs to address over the next 10-15 years. We encourage readers of this draft version to respond with feedback about our summary of the issues, the coherence of our model of reading comprehension, and our sketch of the research enterprise. Ultimately, this document may become the basis for more formal agenda setting. At this point it is an invitation to join a conversation about an area of great practical importance: reading development and reading instruction.

The proposed research agenda builds upon a number of recent efforts to summarize the knowledge base in the field of reading. These efforts include the National Research Council report on Preventing Reading Difficulties in Young Children, the Report of the National Reading Panel, and the recently published edition of the Handbook of Reading Research. Given the availability of these and other older sources,² the RRSG did not see the need to replicate recent efforts to synthesize the knowledge base concerning initial reading and its implications for instruction and assessment of the general population. Thus we argue that the primary challenge of improving reading performance in the early grades is now to incorporate research based knowledge systematically into teacher preparation and practice. We still have much to learn, however, about how children become good comprehenders, how to design and deliver instruction, and how to prevent comprehension failure.³

¹Members of the Rand Reading Study Group are Donna Alvermann, Janice Dole, Jack Fletcher, Georgia Earnest Garcia, Irene Gaskins, Art Graesser, John Guthrie, Michael Kamil, William Nagy, Annemarie Sullivan Palincsar, Catherine Snow, Dorothy Strickland, Frank Vellutino and Joanna Williams.

²Given the availability of these three recent research syntheses, and many additional review papers and volumes (e.g., the first two volumes of the Handbook of Reading Research), this report does not provide individual citations for claims made. We append a bibliography of integrative sources on which we have relied. Since this was an attempt to generate consensus about a research program, we do not make claims based on single studies.

³The fabled Illinois Center for the Study of Reading, of course, focused its research efforts during many years on the task of understanding comprehension, and much of our current knowledge base is due to those efforts. However, the CSR concentrated its attention on cognitive processes, represented in our model under the dimension of 'components.' Our goal is to broaden the research agenda by incorporating additional dimensions, and to emphasize relevance to teacher preparation and instruction.

DRAFT

- 2 -

The RRSg is composed of 14 experts representing a range of disciplinary and methodological perspectives on the field of reading. This group met twice for a total of 7 days, with writing and discussion between the meetings, to establish a convergent perspective on what is known about reading, what are the most urgent tasks in developing an integrated research base, and what needs to be done to improve reading outcomes. The RRSg decided early in its deliberations to concentrate on the issue of promoting skilful reading, with a focus on the development of comprehension and the capacity to acquire knowledge through reading. This is a field in the accumulated knowledge base is limited to particular areas and to particular populations of students. We need to develop a more coherent model of reading comprehension by determining where the most urgent gaps in our knowledge are, by developing networks of communication among researchers currently working in several different research traditions, and by working with teachers and teacher educators to translate research into practice.

What is the core problem within the field of research on skilful reading? At one level, the core problem is the construction of a unifying theory of reading comprehension that acknowledges its complexity and is informed by the multiple perspectives (including educational, cognitive, linguistic, sociolinguistic, discourse analytic, and cultural) that have been brought to bear in the design and conduct of literacy research. Considerable research has been directed at issues of reading comprehension, but these research efforts have been neither systematic nor interrelated. At another level, the core problem presents itself in a practical form when a 6th grade teacher turns to research with the question 'What should I do with my students who don't understand their history texts or can't learn from reading science texts?' Teachers with such questions encounter only a partial knowledge base. That knowledge base typically does not sufficiently acknowledge the exigencies of the classroom, does not attend simultaneously to the demands of reading to learn during content area instruction while still learning to read, and may not be relevant to the reading profiles of many students in a diverse class. Given the enormous educational importance of promoting reading comprehension and learning among elementary and secondary students, we need to organize what we know about these topics, define what we need to know, and pursue the research that will be most important for improving teacher preparation, classroom instruction, and student achievement.

The purpose of the RRSg, then, is to summarize the state of research and research-based practice in the field of reading comprehension, in order to generate a well-motivated agenda for future research that will inform practice in this area. This specific document is a first attempt at describing such a research agenda, formulated so as to elicit commentary from the broadest possible constituency of reading researchers. Because the RRSg did not undertake the kind of extensive, expensive, exhaustive review that informed both Preventing Reading

DRAFT – Released for Discussion Purposes Only

DRAFT

- 3 -

Difficulties in Young Children and the Report of the National Reading Panel, relying instead on consensus and on the distributed knowledge base of its members, this document should be seen as a stimulus to discussion rather than a summative statement.

1.1 Issues Motivating this Report

The proposed research agenda is motivated by a number of overarching issues of concern to the research and practice communities.

1.1.1 The demand for literacy skills is high and increasing. The U.S. economy demands a universally higher level of literacy achievement than at any prior point in history, and it is reasonable to believe that literacy demands will increase in the future. A society with few blue-collar but many service-related and information-based jobs increasingly is demanding high school graduation as a minimum credential for employment. Moreover, advanced vocational or academic training is a requirement now for a wide variety of positions, which previously might have gone to high school dropouts. Thus, ensuring advanced literacy achievement for all students is no longer a luxury but an economic necessity. Utilizing computers and gaining access to the internet make high demands on literacy skills, and in some cases demands for novel literacy skills that we do not yet understand how to teach or analyze.

1.1.2 The level of reading skills is remaining stagnant. Reading scores of high school students, as reported by the National Assessment of Educational Progress, have not improved over the last thirty years. While math scores have improved, reading remains stubbornly flat. In fact, grade 12 students recently decreased significantly in reading achievement. With few exceptions, indicators of achievement in States and Districts have shown no growth or slow growth across the grades, in the past ten years.

Furthermore, in international comparisons of performance on reading assessments, U.S. 11th graders perform very close to the bottom, behind students from The Philippines, Indonesia, Brazil, and other third world nations. This poor performance contrasts with rankings in grade 4, when U.S. students perform close to the top in international comparisons. These findings confirm the impressions of teachers that many students who read well enough in the primary grades confront difficulties with reading thereafter.⁴

1.1.3 Reading comprehension instruction is often minimal or ineffective. Teachers often assume that students will learn to comprehend merely by reading. Although some will, many

⁴ The fall in rankings from 4th to 11th grade may reflect the greater inclusiveness of U.S. secondary education. However, the current insistence on 'educating all students' implies that we cannot hide behind selection bias as an excuse for low performance of high school students.

DRAFT

- 4 -

others will not. Teaching comprehension to children is challenging because reading is complex. Students who are good comprehenders use strategies in reading to learn new concepts, get deeply involved, critically evaluate what they read, and apply their new knowledge to solve practical as well as intellectual problems. But many students fail at doing these things. Furthermore, reading and enjoying high quality literature are valuable for learning, but students must be cognitively engaged in what they read if comprehension is to be fostered. One problem is that materials in the classroom are often too difficult or uninteresting for many students to read. Moreover, comprehension instruction tends to be emphasized less in subject matter classrooms where teachers are focused on content. Sometimes children miss early opportunities to learn because comprehension instruction is delayed until the later elementary grades, even though it should be taught starting from kindergarten. Sometimes reading comprehension instruction is provided by one teacher, but in subsequent years teachers do not build on the foundation established by a teacher in an earlier grade.

Reading instruction is seldom effectively integrated with content area instruction. Children need to read well if they are to learn what is expected of them in school beyond grade three. Teaching in the content areas relies on texts as a major source of instructional content. These texts are not designed to support comprehension instruction, but may be too dense or difficult for students to understand or learn from without some comprehension support. Content area teachers presuppose adequate literacy skills among their students, and are typically not themselves well prepared to teach students with below average literacy skills, despite Sterl Artley's injunction 'every teacher a teacher of reading'. At the same time, there are specific reading comprehension tasks that must be mastered in the context of specific subject matters. Learning discipline-specific vocabulary words, text structures, methods, and perspectives involves acquiring both content and reading skills, simultaneously. The relatively poor performance of U.S. middle school and secondary school students in international math and science comparisons likely reflects in part their poor performance as readers.

The achievement gap between minority and mainstream children persists. Attention to reading comprehension is crucial in a society determined to minimize achievement gaps between mainstream children and those from ethnic and racial minority groups, between urban and suburban, as well as between middle and working class children. National Assessment of Educational Progress scores, for example, show that 17-year-old African-American students score at the level of 13-year-old European-American students—a gap that has decreased only minimally in the last 20 years. This large and persistent gap in reading achievement in the later elementary and secondary grades relates to differences in achievement in other content areas, and to differences in high school dropout and college entrance rates.

DRAFT – Released for Discussion Purposes Only

DRAFT

- 5 -

The explanations for these differences vary. Some of the gap can be explained by cultural and social issues, reflected in the increasing difficulty of making school-based literacy relevant to learners from some groups. Minority children, even middle class members of ethnic minority groups, are likely to have less access to excellent instruction than do white children. In responding to the 2000 NAEP results, Secretary Riley said 'We know today that disadvantaged students are not well served by a watered-down curriculum and low expectations,' yet such is often all that is available to them.

Second language speakers have particular challenges as the reading tasks they face in English push them beyond the simple texts of the 2nd and 3rd grade level. Texts encountered in later grades often incorporate sophisticated vocabulary, linguistic structures, and discourse structures second language speakers do not know. Furthermore, the greater amount of cognitive effort required when reading in a second language may discourage second language learners from engaging in the reading practice they need to become more proficient.

1.1.4 High stakes tests are impacting reading comprehension instruction in unknown ways. The standards-based movement in education is an effort to improve schooling for all children by establishing clear achievement standards. Children are tested to provide information to parents, teachers, and schools about degree of compliance with the standards. Increasingly, failure to meet the standards is being associated with child-specific sanctions, such as retention in grade or withholding high school diplomas. The achievement tests to which these high stakes are attached often reflect reading comprehension ability, even when the specific goal of the test is to assess knowledge in the content areas. There is very little data on the impact of high stakes tests on student achievement overall, though some data suggest an increase in dropout rates, and it is clear that much instructional time is devoted to test preparation. In particular we need to know how poorer comprehenders are selectively affected either by the tests themselves or by the various consequences associated with them.

1.1.5 The preparation of teachers does not adequately address children's needs for reading comprehension instruction. We know that child outcomes relate to the quality of the instruction received, which in turn reflects teacher preparation and ongoing teacher professional development. Yet teacher preparation and professional development programs are inadequate in the crucial domain of reading comprehension, in part because the solid, systematic research base that should undergird teacher preparation does not exist.

1.1.6 Making good on the federal investment in education requires more knowledge about reading comprehension. The recent implementation of the Reading Excellence Act (REA) has as a major goal the introduction of instructional practices that have a basis in research.

DRAFT – Released for Discussion Purposes Only

DRAFT

- 6 -

Efforts funded through REA are currently focused on beginning reading instruction. However, the successful development of beginning reading skills does not ensure that the child will automatically become a skilled reader. The fourth grade slump in reading achievement is a well-documented phenomenon. Explicit instruction in reading comprehension is essential for many children in ensuring the transition from beginning to skilful reading. Presently the research base necessary to inform teachers and schools about best practices for teaching reading in the postprimary grades is not adequately developed. The enormous investment (\$260 million) in REA will be lost without development of our knowledge base concerning reading comprehension.

1.2 What We Know

While these various overarching issues may make the task of developing a research agenda that would contribute to the improvement of practice seem formidable, we are encouraged by the recognition that there is a good deal we already know in addressing the practical challenges of improving reading comprehension outcomes.

First, we know some of the prerequisites to successful reading comprehension. We know, for example, that reading comprehension capacity builds on successful initial reading instruction, and that children who can read words accurately and rapidly have a good foundation for progressing well in comprehension. We know that children with good oral language skills (large oral vocabularies, good listening comprehension) and with well-developed stores of world knowledge are likely to become good comprehenders. We know that social interaction in homes and classrooms as well as the larger sociocultural context influence motivation and participation in literate communities and help construct students' identities as readers, thus influencing their access to text. We know that children who have had rich exposure to literacy experiences are more likely to succeed. We know about several instructional practices that are related to good reading outcomes, although such knowledge is much more extensive for initial than for later reading. Finally, we know that instruction based on an appropriate and well-articulated alignment between curriculum and assessment can improve performance in reading as well as other areas.

We also know several approaches to education and to reading instruction that do not work. We know, for example, that many approaches to compensatory education for socially, economically, and educationally disadvantaged groups do not promote success in reading comprehension. We know as well that identification of children as learning disabled, without specific instructional treatments tailored to their individual needs, fails to generate reading comprehension gains. We know that current approaches to teaching second language learners, whether in ESL, bilingual, or all-English settings, often do not address the particular challenges of reading comprehension. We know that the enormous complexities of teaching and the brevity of

DRAFT

- 7 -

teacher education programs have the unfortunate consequence that the vast majority of novice teachers are ill prepared to engage in practice that reflects the existing knowledge base about reading. We know this situation is particularly critical for special education, ESL, and bilingual teachers who, while requiring an even deeper understanding of reading, language, curricula and instructional practices than the mainstream teacher, in fact have even fewer opportunities in their preparation programs to acquire this expertise. We know that professional development in the domain of early reading instruction is improving, increasingly incorporating information from research about the characteristics of good instruction, but that such is not the case for reading comprehension instruction in the later elementary grades. We know that a frequent consequence of failure on high-stakes assessment, namely retention in grade, does not improve long term reading achievement without specialized instruction. Finally, while we have a fairly long list of instructional strategies that have been shown to be effective in targeted interventions or experimental settings, we need to know how to implement these teaching approaches on a large-scale basis, into a coherent reading program that spans the elementary, middle and high school grades.

1.3 Defining Reading Comprehension

The larger agenda that concerns the Rand Reading Study Group is the promotion of skilful⁵ reading. We see achieving reading proficiency as a long-term developmental process; skilful reading has different characteristics at different points along its developmental trajectory. The endpoint, adult skilful reading, encompasses the capacity to read, with ease and interest, a wide variety of different kinds of materials for varying purposes, and to read with comprehension even when the material is neither easy nor intrinsically interesting. Adult skilful reading involves reading for purposes of pleasure, learning, and analysis, and represents a prerequisite to many forms of employment, to informed participation in the democratic process, and to gaining access to cultural capital.

Our focus in this document is on one aspect of skilful reading, reading comprehension as it is traditionally conceived of within educational settings. Teachers think of reading comprehension as what students are taught to do in reading instruction during the early school years, and the capacities they are expected to display throughout the middle and high school years. Reading comprehension is usually a primary focus of instruction in the postprimary

⁵ We adopt the spelling 'skilful' not just because it is the default in the Microsoft Word spellchecker, but also to distance ourselves intentionally from the concept that competent reading is a cluster of individual skills that can be learned and practiced independently of each other.

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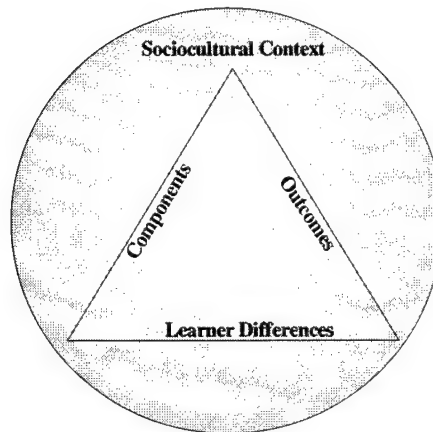
- 8 -

grades, after word recognition skills have been largely mastered, though comprehension of text should also be an integral part of reading instruction with beginning readers as well.

Our first task in formulating this research agenda was to define what we meant by reading comprehension. A useful definition would generate a map of what we know and what we need to know about the process and development of skilled reading comprehension.

We define reading comprehension as the process of constructing meaning through interaction and involvement with written language. The reading comprehension process includes three dimensions: the cognitive components involved, the outcomes, and reader differences. These three dimensions define a phenomenon that occurs within a larger sociocultural context (see Figure 1), which shapes and is shaped by the reader, and which comes into contact with each of the dimensions, influencing knowledge, processing, purposes, outcomes, and the nature of reader differences. The sociocultural context affects students' acquisition of the reading components, their demonstration of outcomes, and often is a source of individual and group reading differences. It mediates students' experiences, just as students' experiences influence the context.

Readers comprehend texts by extracting and creating meaning. Successful comprehension entails a variety of prerequisite skills, abilities and knowledge. A reader must be motivated and engaged with the text and must have a purpose or a goal for reading. Readers use a variety of cognitive and metacognitive strategies to draw on their knowledge to arrive at a meaning. Among the kinds of knowledge a reader uses are world knowledge, linguistic knowledge, discourse knowledge, and vocabulary. In addition, readers have to process many non-print sources of information (pictures, tables, charts, etc.) to comprehend the text fully. Fluency is also an important element in comprehending text. That is, in order to orchestrate the components of comprehension, a reader should be able to do oral reading with reasonable speed, accuracy, and expression.



245

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Figure 1. Dimensions of Reading Comprehension

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Note: The three dimensions of reading comprehension form the sides of a triangle, to indicate perspectives which all must be considered in the analysis of reading comprehension. The triangle is displayed within a circle representing the sociocultural context within which any act of reading must be interpreted.

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The end of comprehension can be the acquisition of knowledge or the confirmation of knowledge. Comprehension can also lead to applications, as in following directions. Or comprehension can lead to involvement in the meaning of the text, as when a reader gets lost in a story.

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While we can describe an archetypal process of comprehension, we must also describe the sources of variation that are reflected in individual acts of comprehension. All readers have different knowledge and strategies for interacting with text. Consequently, comprehension is different between and among readers as a function of those differences. These differences account for the variations in comprehension between readers and for differences in the same readers at different times for different tasks. Some of these differences depend on the tasks, developmental stages, social, cultural and language backgrounds of the readers. The sociocultural context in which reading occurs imposes values and restrictions on meaning for what is read, why it is read and how it is to be interpreted.

1.4 Components

Reading comprehension is, in part, comprised of a set of cognitive components and processes. These can be conceived of as the various things that have to happen, in some combination, when an act of comprehension while reading occurs. These components interact in combination during comprehension activities. Virtually every component we discuss has a processing aspect (i.e., cognitive operations and procedures) and a content aspect (i.e., language codes, knowledge structures). We started by sifting through the research literatures to select the components that met the following criteria:

- There is good evidence they are essential for reading comprehension
- They are distinguishable from one another
- They are relevant to many different reading tasks
- They function both individually and in various combinations for successful comprehension.

Nine components fulfilled these criteria. These represent, in our view, components that get called upon when reading in order to generate comprehension of the text. For each of these, we evaluated the research base with two questions in mind: a) is there sufficient knowledge about the component itself and about its relation to reading comprehension? b) is the available knowledge being utilized in practice (instruction, design and selection of materials, and teacher preparation)? Using this information, we established for each of the nine components a sense of the need for further research of either of two types: research to expand our knowledge base about the component itself, and research to develop, implement, and evaluate instructional applications grounded in the knowledge base. We discuss each of the nine components in turn, including examples of questions that might form part of the research agenda associated with each.⁶

1.4.1 Vocabulary. We use the term vocabulary here to refer specifically to knowledge of word meanings. (Development of sight word vocabulary, as aspect of word recognition, is dealt with in this report only insofar as it impacts comprehension via fluency.) The large body of research on vocabulary has consistently shown the importance of vocabulary knowledge for

⁶ The questions presented in this portion of the document are meant to be examples of how questions could be focused on each of the components. They all represent questions we consider important, but they have not been prioritized. We discuss in a final section of this document our process for assigning priorities to various topics. Assigning priorities to specific questions should, we argue, await feedback from the field.

DRAFT

- 11 -

comprehension. This relationship is remarkably robust across ages and populations. Recent analyses of vocabulary instruction show that explicit vocabulary instruction produces gains in comprehension. Despite these findings, current practice de-emphasizes vocabulary instruction, in part because traditional, definition-based approaches to vocabulary instruction are not very effective, either for increasing vocabulary or for improving reading comprehension.

Questions:

- What vocabulary should be taught? How much vocabulary should be taught? How should teaching methods be adapted for different categories of vocabulary words?
- What is the optimal combination of focus on individual words and word-learning strategies?
- What knowledge, skills, or abilities are needed to benefit from vocabulary instruction (e. g. dictionary skills, metalinguistic abilities, language proficiency level)?
- What are effective methods for increasing the reading vocabulary of learners of English as a second language?

1.4.2 World knowledge. World knowledge comes from experience and from texts previously read. A large amount of research has demonstrated the importance of world knowledge for reading comprehension. We know that most children from middle-class families enter school with more world knowledge about school-related topics than do most children from poor families. We also know that children from working class and/or ethnic minority families often enter school with specific knowledge related to their own cultural and community backgrounds which teachers may not make relevant to the texts being read. When the knowledge that readers bring to the reading of a text is untapped, comprehension is imperiled.

Questions:

- How do readers coordinate world knowledge with texts and generate relevant inferences?
- How does lack of appropriate world knowledge influence reading comprehension?
- What are the conditions under which world knowledge interferes with or facilitates reading comprehension?
- What factors help or hinder students in making connections between text and their knowledge of the world?

1.4.3 Motivation. The expert reader is motivated. Motivation is defined here as encompassing intrinsic motivation, extrinsic motivation, self-efficacy, social goals, and experience

DRAFT – Released for Discussion Purposes Only

DRAFT

- 12 -

reading. Reading motivation is highly correlated with reading proficiency, and research addressing the directionality of these relationships is strongly needed.

Because reading is an effortful activity that involves choice (“Am I going to read or do something else?”), motivation is fundamentally important to reading comprehension. Motivational processes such as intrinsic motivation and self-efficacy are needed to energize and direct the cognitive strategies central to reading comprehension. Recent research suggests that elementary school aged children with stronger reading motivation spend substantially more time reading than do students with lower motivation. Children who read more frequently demonstrate better reading comprehension. Unfortunately, although most children initially are positively motivated toward reading, many lose their motivation as they go through school. Instructional programs that maintain and enhance motivation, thus, are needed.

Reading motivation is multifaceted; that is, motivation consists of a number of aspects. First, children with a strong sense of competence or efficacy are likely to engage and achieve. Second, research suggests that when children are intrinsically motivated to read, value reading highly, and are oriented toward the goal of mastery goal orientations, they are more likely to engage and achieve in reading. Third, extrinsic motivation such as recognition and competition are associated with reading achievement and amount of reading. Motivation often is considered a characteristic of the individual. However, instructional practices and other classroom context factors strongly influence children’s motivation. There are needs for instruction supportive of reading motivation as well as assessments that measure aspects of students’ motivation and self-efficacy in reading.

Questions:

- How can reading motivation and self-efficacy in reading be conceptualized in terms of existing motivation theories, and new, theoretically grounded descriptions of motivation for different populations of readers, texts, contexts and ages?
- How does reading motivation relate to reading comprehension, both directly, and as it may be mediated through behaviors such as amount of reading, and use of cognitive reading strategies?
- What are the characteristics of texts and textbooks, such as personal or cultural relevance, structure of text, and vividness of details that make them interesting?
- How is reading motivation influenced by context variables such as task success, “hands-on” activities, (e.g., science observation, historical enactment), autonomy support, personal or cultural relevance, and teacher/peer characteristics?

DRAFT – Released for Discussion Purposes Only

DRAFT

- 13 -

1.4.4 Purposes and goals. Students who are expert readers are purposeful. They have specific goals for reading such as gaining knowledge, enjoying literature, locating specific information, and learning from text in order to solve problems. Students with clear goals are better comprehenders than students with vague goals. Goals may also be motivational and social. For example, students with the motivational goal of mastery use better reading strategies than students with the performance goal of gaining recognition as a good reader.

Questions:

- How do students' purposes for reading about a topic relate to their knowledge level, their interest, and their competence in using other reading strategies?
- What are the purposes for reading that increase reading comprehension most strongly for specific populations of readers?
- What are the purposes for reading that increase reading comprehension most strongly for various types of readers?

1.4.5 Cognitive/metacognitive strategies. Strategies are processes and procedures that readers use in comprehending text. Some of these strategies reflect conscious awareness whereas others are acquired without conscious effort or become automatic with practice. A strategy is regarded as metacognitive if its use is triggered by the reader's assessment of his or own cognitive state, for example, the reader slows down when reading text on an unfamiliar topic or rereads a sentence that contradicts previously held beliefs. Cognitive and metacognitive strategies have been extensively investigated in the fields of cognitive psychology, cognitive science, and education during the last four decades, so there is an abundance of mature theories that are grounded in empirical research. Some individual strategies have proven to be effective in laboratory, group, and classroom environments (such as comprehension monitoring, question generation, the construction of explanations, and the construction of story structures). Some strategies have been frequently investigated in the laboratory, but rarely in the classroom (such as building coherent mental models of what the text is about, generating particular classes of inferences, and integrating the current text with other texts). There is little knowledge available about the prerequisites to effective strategy instruction.

Questions:

- Under what conditions can students learn comprehension strategies most effectively?
- To what extent are the strategies effective at different ages and levels of ability?

DRAFT

- 14 -

- To what extent is the effectiveness of these strategies dependent on domain knowledge?
- At what age and under what conditions can bilingual students acquire and use cross-linguistic knowledge and strategies to improve their reading comprehension?

1.4.6 Linguistic knowledge. Linguistic knowledge encompasses oral language capacities, both production and comprehension, and the capacity to reflect on one's knowledge of language. Successful reading depends on extensive knowledge at all linguistic levels – phonology, morphology, and syntax, as well as higher-level discourse structures.

Children's oral language knowledge has been shown to contribute to their reading comprehension in a variety of ways. For example, children's listening comprehension becomes more highly correlated with reading comprehension as children grow older. Measures of syntactic knowledge also predict both language and reading comprehension, as do measures of morphological knowledge.

Children's awareness of language units and structures also contributes to reading comprehension. The role of phonemic awareness in early reading has been well documented. However, there is growing evidence that after second grade other types of metalinguistic awareness, in particular syntactic awareness, make a greater contribution to the comprehension.

Written language has a number of linguistic features, which may not be familiar to many students. One is more complex syntax. The vocabulary of written language also has a more complex morphology than oral language – it is richer in prefixed, suffixed, and compound words. The different genres and types of text encountered in later grades make specific linguistic demands on the reader.

Although the relationship between linguistic knowledge and reading comprehension is well documented, there are a number of research questions, which still need to be addressed, such as the following:

Questions:

- Syntactic knowledge is presumably both a contributor to, and consequence of, growth in literacy. What is the nature of the relationship between syntactic knowledge and growth in literacy, and how can it inform our understanding of reading comprehension?
- What type of metalinguistic knowledge and abilities contribute to reading comprehension?

DRAFT

- 15 -

- What linguistic features differentiate electronic text, hypertext, and multimedia from conventional texts?

1.4.7 Discourse knowledge. Expert comprehenders use discourse knowledge to connect text elements in a coherent fashion and to relate the content to the messages of the author. Discourse knowledge includes the structure of different text genres (e.g., narrative, expository, persuasion), the distinction between given (old) and new information in the discourse context, the points (main messages) that the author intends to convey, the topic structure, the pragmatic goals/plans of the communicative exchange, and the function of speech acts (e.g., assertion, question, directive, evaluation). Discourse knowledge builds on linguistic knowledge but is distinct from it. A moderate amount of research has been conducted in the fields of discourse processing and education, but more basic research is needed. Children's understanding of narrative text has been extensively investigated, whereas the comparative lack of studies of expository text and the prevalence of expository tests in the later school years give this topic considerable urgency for all ages and dimensions of reader differences. There is a complex interaction between world knowledge and discourse knowledge that needs further exploration.

Questions:

- How is discourse knowledge of print acquired?
- How do readers understand the structure of expository texts with different structures (e.g., problem-solution, claim plus evidence, cause-effect)?
- How do readers understand the pragmatic function of sentences and utterances conveyed in the text?

1.4.8 Fluency. Fluency is defined as effortless reading with ease and expression. Fluency includes accuracy and automaticity of word identification, ease in decoding, and expressiveness in reading connected text. It presumes accurate word identification and decoding ability. We have extensive knowledge of these latter two components, including basic research on the relation of fluency to comprehension and findings concerning classroom practices to promote fluency. There is ample evidence that the most effective instructional method for all types of children integrates explicit instruction about the alphabetic principle with attention to comprehension. These programs, however, have often not adequately addressed the fluency component of skilful reading. Without adequate fluency even readers who have good word identification and decoding abilities cannot comprehend text easily.

DRAFT

- 16 -

Reading theory suggests that fluent reading consumes few cognitive resources, releasing attentional and other capacities for use in comprehension. More research on the relationship of fluency to vocabulary and comprehension is needed. We know that practice enhances fluency. Two instructional methods are effective: (1) repeated reading, in which a single text is re-read several times; and (2) guided oral reading with feedback. Both methods lead to improvement in word knowledge, reading speed, oral accuracy, and, to a lesser extent, comprehension. Both good and poor readers benefit, but not all practice is effective.

Questions:

- What are the characteristics of effective interventions to improve fluency for poor comprehenders, including the amount of reading or re-reading that is involved and the nature of the feedback?
- How is the relationship among practice, fluency, and reading comprehension affected by the type of text read?
- What is the relationship between fluency and comprehension for readers of English as a second language?

1.4.9 Integrating nonprint information with text. Reading comprehension often requires the integration of print and non-print information, such as graphs or pictures. In electronic text, there are often multimedia components (e.g. sound or video information) that need to be integrated with text for efficient reading comprehension. Use of electronic text is widespread and rapidly becoming a commonplace in schools and classrooms. However, there is very little knowledge about the processes involved in multimedia integration. Because the amount of multimedia information is increasing so rapidly, there is an urgency to determining the ways in which this information can be processed effectively. Instructional research has a lower priority until more basic knowledge is accumulated.

Questions

- What skills or abilities are necessary to integrate multimedia information and conventional text?
- What is the overlap between the skills and abilities necessary to comprehend conventional text and the skills and abilities needed to comprehend and integrate multimedia information?
- Under what conditions does multimedia information enhance or interfere with comprehension of conventional print?

DRAFT

- 17 -

1.4.10 Summary. We have presented here nine components that we argue define the cognitive representations and processes involved in reading comprehension. Since individual or group differences on any of these components would be hypothesized to relate to differences in reading outcomes, understanding these components and their interrelationships better is an important target of research. Nonetheless, we do not propose that this list of components by itself defines reading comprehension, nor that research on them would constitute a complete agenda for understanding comprehension.

1.5 Outcomes

The second dimension that defines reading comprehension is the potential outcomes of the act of comprehension. The categories of outcomes we propose encompass many that are richly represented in the models of reading comprehension that motivate current instructional and assessment practices, whereas others are rarely included in assessment and only inconsistently in instruction.

We have defined three major classes of outcomes, with examples under each of specific operations that readers might engage in. The relevance of these specific tasks to an assessment agenda is discussed later in this document.

1.5.1 Knowledge. Successfully comprehending a text involves understanding the content of what is read, integrating new with already stored information, and critically evaluating the information presented. In the process of comprehending, new specific pieces of knowledge are acquired and linked to previously acquired knowledge. Understanding involves drawing appropriate inferences as well as interpreting the information that is explicitly conveyed. Good comprehenders evaluate what they learn while reading, and develop new knowledge structures as a consequence of reading. People often think of this as getting the point while also reading between the lines. Specific operations that reflect gaining knowledge include:

- Getting the gist
- Recalling what was read
- Gaining content knowledge
- Drawing appropriate inferences
- Learning new vocabulary items
- Evaluating the relation of new to previous knowledge
- Changing beliefs based on new knowledge

DRAFT

- 18 -

1.5.2 Application. Content becomes useful when it can be applied to practical problems and tasks, such as programming a VCR or baking a soufflé, or to intellectual tasks such as figuring out a writer's political stance or analyzing an argument. Good comprehenders apply what they have understood from reading both in day to day functioning and in learning about new topics. An aspect of using knowledge effectively is judging its importance and relevance to one's tasks. Specific operations include:

- Using newly acquired knowledge in further comprehension
- Performing a task
- Solving a problem
- Building connections
- Evaluating utility of knowledge

1.5.3 Engagement. Good comprehension is characterized by deep concentration and becoming absorbed in reading. In other words, good comprehenders are often involved with the ideas, the emotional experiences, and the style of text. They read purposefully, for both affective and intellectual goals. They have confidence in their ability to understand what they read. They also evaluate the quality of the texts they read and determine the relevance of those texts to their own lives. Operations that reflect engagement include:

- Reacting aesthetically
- Monitoring topic interest
- Showing motivation and efficacy
- Evaluating critically

1.6 Reader Differences

While the two dimensions of components and outcomes might be sufficient to define reading comprehension from the perspective of a single reader, they clearly fall short in defining reading comprehension as a field of study. A third dimension is needed to represent the sources of variation in the way reading comprehension occurs. Indeed, we think of reading comprehension as a triangle with each edge representing one of the dimensions, and each defining a set of factors that should be incorporated into any research agenda.

Thus, we incorporate into our definition of reading comprehension as a field of study the dimension of reader differences, i.e., sources of variation in the functioning of the various processes in service of the various outcomes. We include reader difference in our definition in

DRAFT

- 19 -

part because some of these sources of difference (e.g., the developmental differences associated with age and instructional history, or the intra-individual differences associated with text and task) alter the ways in which the components work in comprehension, and affect reading outcomes. Reader differences are an important source of variance in outcomes that can help us understand what factors influence comprehension.

We include others, such as cultural, language, and social differences, both because they address the overarching issues which motivate this agenda and because discovering such differences might well cast light on our basic understanding of reading comprehension. Most important, we include the dimension of differences to emphasize the dynamic nature of reading comprehension, its susceptibility to influence from a wide array of intra- and inter-individual as well as group factors. We discuss reader differences starting with the individual and moving out to the sociological. As we did for the components, we provide sample questions that might be formulated about each of the sources of difference.

1.6.1 Intra-individual differences. By intra-individual differences, we mean differences in the reading performance of a single reader that emerge as a function of interest, situation, motivation, or other factors. Every student has a particular profile of reading competencies and interests. For example, some students read stories frequently and are expert in story comprehension, whereas they rarely read electronic text. In contrast, other students may be competent on computer and Internet reading, whereas they are not proficient in interpreting written stories. These intra-individual differences are not well represented in current measures of reading comprehension and are seldom used productively in instruction.

Questions:

- What are the patterns of intra-individual differences in competence that appear among students at different ages?
- How can teachers take advantage of special student reading expertise and motivation to increase the effectiveness of classroom instruction?
- How would we design assessments that better reflect students' reading competencies, by identifying the extent and patterns of intra-individual differences?

1.6.2 Inter-individual differences. Individual children and adults vary in their reading comprehension abilities. Some of this variability, no doubt, reflects the assessment procedures used to measure reading comprehension. In addition, though, learner characteristics may partially account for these differences. Thus, differential development of a variety of capacities prerequisite to reading comprehension, such as nonlinguistic abilities and processes (e.g.

DRAFT

- 20 -

attention, visualization, inferencing, reasoning), can generate varying outcomes. Similarly, differences in the nine components of reading comprehension identified above may lead to patterns of relative strengths and weaknesses that are directly related to variations in reading comprehension abilities. The degree to which these components develop in an individual child or adult may well account, in part, for individual differences in the development of reading comprehension abilities. Thus, it would seem that such variables may be usefully targeted in research evaluating inter-individual differences in reading comprehension.

Questions:

- What is the evidence that specific components such as those exemplified above account for inter-individual differences in reading comprehension?
- Are specific skills, abilities, and knowledge such as those exemplified above differentially weighted as determinants of inter-individual differences in reading comprehension?
- Are there developmental differences in the contribution made by reading-related skills, abilities and knowledge in accounting for inter-individual differences in reading comprehension?
- To what extent do affective and motivational variables mediate the contribution made by nonaffective/nonmotivational variables in accounting for inter-individual differences in reading comprehension?

1.6.3 Social class differences. Social class refers to the status individuals are accorded in a society. This status is a function of race, gender, ethnicity, language, and economic conditions. Research has demonstrated consistent effects of social class on reading achievement. For example, low SES schools generally produce lower reading achievement than high SES schools. Similar findings exist for many of the other components of social class. What is needed is a more complete exploration of the full range of socioeconomic effects and their relationships to reading comprehension.

Questions:

- How do the various social class characteristics of readers affect their reading comprehension?
- Are there specific comprehension processes that vary with readers' social class characteristics?

DRAFT

- 21 -

- How do social class characteristics of readers interact with other individual differences?

1.6.4 Cultural differences. All cultures, as historically evolved beliefs, values, and ways of organizing the tasks of life, teach people about what is worth working for, how to succeed, and who will fall short. Cultures offer a wealth of positions that readers can inhabit. Each position requires certain things. For example, to inhabit the position of "good reader," one must possess certain abilities that are verifiable and recognizable to others who occupy that same position. But how children end up inhabiting some positions and not others in their classroom environments is more a matter of being put into those positions because of differential instruction, teacher attitudes, and expectations than of being incidentally placed into them. Researchers working within a sociocultural framework recognize the possibility that youth who are routinely described as resistant readers may actually be readers who use alternative literacy practices, such as transcribing hip-hop performances or composing love letters, to express themselves and to make meaning of texts that are essential to their very survival. A productive research focus would highlight situational contexts promoting success at various sorts of literacy tasks.

Questions:

- In what way do readers' cultural expectations influence their comprehension processes?
- How do different sociocultural groups differ in their definitions of successful reading comprehension, and in the tasks they would value as operationalizing successful reading comprehension?
- What are the effects of cultural differences on reading comprehension?

1.6.5 Language differences. Readers differ in how they use language to communicate, in the forms of language that they speak, and in the number of languages that they know. Differences in communication practices and in language or language variety spoken have major implications for children's reading comprehension development, especially when teachers do not acknowledge or understand the different ways in which children communicate and the various languages that they know. A child's capacity to use a first language as a resource in learning oral and literate English may well depend on aspects of instruction and interaction with teachers. Monolingual readers also differ in their oral language development, knowledge of linguistic structures, exposure to rhetorical forms, and vocabulary development. These aspects of their language development influence their ability to comprehend increasing levels of text difficulty.

Questions:

DRAFT

- 22 -

- How do differences in oral language proficiency (vocabulary, syntax, knowledge of rhetorical structures) affect the reading comprehension of children at different ages?
- What is the role of English oral language proficiency versus first language literacy in reading comprehension for second language/bilingual students?
- How does language variation affect students' reading comprehension?

1.6.6 Developmental differences. The general goal of developmental research is to investigate particular psychological constructs (e.g., reading comprehension) in terms of its basic components, the age of first appearance of each component, the course of development toward automaticity of each component, the integration of components with each other, the degree of independence among the components, and the change of conditions with age that enable the components to function together. Although developmental differences are related to child age, they are also crucially influenced by amount and quality of instruction. There are a number of classic questions to be addressed in developmental research on reading.

Questions:

- When does each reading comprehension component first appear chronologically?
- As age increases, does a given component become automated, thus permitting other components to appear?
- When (and how) does each component become integrated with other components?
- To what extent are changes across time in the major construct (or its components) qualitative or quantitative?

1.6.7 Summary. Figure 1 summarizes the model of reading comprehension we believe helps organize the issues and the agenda for future research. Comprehension is viewed as having several components that together produce beneficial outcomes, with sources of reader differences that are partly explained by sociocultural context. This model suggests that research on comprehension specify the component processes being called upon, the comprehension outcomes being elicited, and how the various sources of reader differences are being accounted for.

Obviously, no single research undertaking considers all nine components, all three outcomes, and all six sources of difference simultaneously. Nonetheless keeping the full complexity of this model of reading comprehension in mind could help researchers locate their own research focus on the larger landscape defining the phenomenon. Recognition by individual researchers of the potential working of all the various components, the variety of outcomes, and

DRAFT – Released for Discussion Purposes Only

DRAFT

- 23 -

676 the full array of sources of difference among readers could improve the systematicity of reading
677 comprehension research by providing a basis for understanding the relations among targeted
678 research efforts.

DRAFT

-24-

2.0 THE RESEARCH AGENDA: IMPLICATIONS OF THIS MODEL OF READING COMPREHENSION

In this section of our report, we formulate the most important issues to be addressed within the field of reading comprehension, based on the model of reading comprehension presented above. The summary of our state of knowledge about each of the dimensions in the model, presented above, included questions about those specific topics, which of course should find their place in a larger research agenda. In addition, though, many questions about the important topics of assessment, instruction, sources of poor reading comprehension, teacher preparation, and institutional structures and policies cut across the three dimensions in our model of reading comprehension. Thus, we turn in this section to a presentation of the questions the RRSg considered most important under each of those topic headings. Example questions are suggested for each issue. A much longer list of questions related to these issues generated by the RRSg is included in the appendix.

In the final section of the document, we discuss strategies in setting priorities. Under this topic, we include prerequisites to establishing a research program that would carry out the agenda, issues of infrastructure and methods, as well as the thinking behind our own identification and classification of priorities.

2.1 Assessment

One could point to a plethora of studies and policy discussions about comprehension assessment over the last 10 years. These have addressed topics such as the use of performance assessments, portfolios, and other assessment formats (multiple choice, essays, fill-in-the-blank questions). Unfortunately, the research community has not provided educators with assessment procedures that can optimally inform practitioners or policy makers. Furthermore, their own research activities would benefit from a more comprehensive and more theoretically grounded assessment system.

As noted above, our identification of the three broad categories of the outcomes of reading comprehension leads to a new way of thinking about the nature of comprehension assessment. Currently, comprehension assessments are heavily focused on only a few tasks: reading for immediate recall, reading for gist, and reading to infer or disambiguate word meaning. Assessment procedures to evaluate learners' capacities to modify old or build new knowledge structures, to use information acquired while reading in the interest of problem solving, to evaluate texts on particular criteria, or to become absorbed in reading and develop affective or

DRAFT – Released for Discussion Purposes Only

DRAFT

- 25 -

aesthetic responses to text have occasionally been developed in the pursuit of particular research programs, but have not influenced standard assessment practices. We know that assessments, in particular high stakes assessments, influence instruction. Thus the absence of these tasks in widely used reading assessments diminishes emphasis on them in instructional practices as well.

We argue that a system of reading assessment should reflect the full array of important reading comprehension consequences, and that a research program to establish expectable levels of performance for children of different ages/grades on this full array of outcomes is necessary. Such a program is prerequisite to developing criteria for performance at different age/grade levels, and to pursuing questions about reader differences associated with instructional histories, social class, language, and/or culture in reading comprehension outcomes.

While the reading comprehension outcomes defined above constitute the basis for designing a comprehension assessment that would reflect success, our model suggests that assessments designed to reflect the components of reading comprehension are also necessary. For instance, when the outcomes-assessment identifies children who are performing below par, component-oriented process assessments could be helpful in indicating why their reading comprehension is poor. Furthermore, component-oriented assessments are crucial in dissecting the impact of particular instructional or intervention practices.

In short, a comprehensive assessment program reflecting the tripartite model of reading comprehension presented here would have to satisfy many requirements that have not been addressed by any assessment instruments, while also satisfying the normal psychometric criteria. We present a complete list of requirements for such a system in Appendix A. Central requirements included in that list are the capacity to identify poor comprehenders, to identify sources of poor comprehension and subgroups of poor comprehenders, sensitivity to development and to instruction, and utility for instructional decision-making.

A sample of issues that would certainly arise in the process of developing a comprehensive assessment system for reading comprehension would include:

- The impact of various response formats on performance
- Variation in performance across text types
- The impact of nonprint information
- The impact of various sorts of formats and accommodations on the test performance of learners of English as a second language
- Variation in performance across a variety of discourse types and genres, including hypertext

DRAFT – Released for Discussion Purposes Only

DRAFT

- 26 -

- The impact on performance of specifying different purposes for reading
- The capacity to differentiate domain-specific and reading-general components
- The need to reflect performance on literacy tasks typical of electronic reading, such as retrieval

The capacity to explore some of the components that go outside the traditional rubric of comprehension, such as scanning, intertextuality, domain specific strategies, consulting illustrations, and so on.

2.2 The Development of Automated Reading Assessment Systems.

We see the development of an assessment system for reading comprehension as having a very high priority. We recognize that developing a comprehensive assessment system is a long-term project. A crucial piece of such a system is criteria for judging performance across the developmental span. Nonetheless, a substantial start could be made in the short run, either by targeting assessment of outcomes and components as a major task of the research agenda, or by encouraging the development of prototype assessments for outcomes and components within other research efforts (such as research focused on instructional efficacy). Such an effort would be central to pursuing larger research agendas, e.g., longitudinal work to create a picture of the development of reading comprehension, a large-scale effort to determine how American children are functioning as readers, or a systematic pursuit of differences in reading comprehension performance related to culture, social class, language status.

The approach to assessment proposed here differs from current approaches to reading assessment in that it is based on an appropriately rich and elaborated theory of reading comprehension. Assessment procedures generated by this approach are thus also more likely to be influenced by theoretically grounded reading research. It also places high value on the utility of assessment for instruction. Given the high time demands that comprehensive assessment systems can place on students, developing assessments that are embedded in and supportive of instruction would allow the accumulation of better knowledge about student achievement in the context of improved instruction.

2.3 Instruction

The definition of reading comprehension presented here generates a very long list of potential research questions, examples of which we have presented above. It acknowledges only glancingly, though, the topic of instruction. Of course, many of the components identified are developed through instruction, but direct links to questions about how to teach reading comprehension, what materials to use in teaching it, what specific skills or strategies to teach,

DRAFT – Released for Discussion Purposes Only

DRAFT

- 27 -

and what teachers need to know in order to teach it well are not typically linked to specific component processes, outcomes, or learner characteristics. In addition, the type of instruction needed to promote the reading comprehension of students from diverse cultural and linguistic backgrounds needs to be specifically addressed. Thus, here we add another layer to the research agenda, questions about instruction broadly conceived.

There is an important distinction to be made between curriculum and instructional practice. Curriculum addresses the question, 'What is worth knowing?' What topics should be addressed in comprehension instruction? The model proposed here, for example, might suggest a curriculum focused, in part, on vocabulary, world knowledge, linguistic and discourse knowledge, or an emphasis on different outcomes of reading such as reading for the gist or to gain content knowledge. But there are many other comprehension curricula currently in practitioners' hands, including the old basal reading programs that focus on discrete skills, the strategies found in the report of the National Reading Panel, or curricula related to various systems of benchmarks and standards for reading.

Instructional practices, on the other hand, refer to what teachers say and do to teach these topics. For example, a teacher may wish to teach vocabulary as part of her comprehension curriculum. The curriculum is vocabulary and the instructional practice is *what the teacher says and does* to teach vocabulary. In addition, a teacher may wish to teach fluency by modeling with a picture book how good readers read with expression. The curriculum is fluency and the instructional practice is the teacher reading a picture book aloud in an expressive manner.

2.4 Comprehension Instruction

There is a body of knowledge about instructional practice that promotes reading comprehension and student engagement. For example, research shows that instruction in summarizing text, explaining text, and asking questions increases students' comprehension of text. Researchers have also developed specific instructional programs that have been shown to be effective in promoting reading comprehension. However, there are many activities and practices currently being used that have not been empirically substantiated.

Two critical questions arise: Which curriculum best promotes comprehension? What instructional practices (what teachers say and do, not what activities are used) promote comprehension? Both questions need research..

In this section and those that follow, we first identify overarching questions that have high priority. Underneath each of these, we list examples of more specific research questions.

DRAFT

- 28 -

Overarching Question: What does good comprehension instruction look like at different ages and reading levels in terms of activities and practices?

- What is the effect of mandated frameworks on effective reading comprehension instruction?
- What are the effects of different types of materials and formats on comprehension instruction?
- What are the elements of vocabulary instruction that make a difference in students' comprehension?
- What is the effect of writing on reading comprehension?

2.5 Content Area Instruction

The amount and difficulty of expository or nonfiction text that students are expected to read and comprehend increases dramatically at the end of the primary grades. Reading assignments are given in social studies, science, and mathematics texts, often with the expectation that students will know how to comprehend the dense text of content-area materials without specific instruction in how to do so. Not all students who successfully read narrative text cope successfully with this transition. However, we know that such students can be helped by teacher explanations and modeling about how to think their way through content-area texts.

Overarching Question: How can students' comprehension of content-area materials be improved at elementary, middle, and high-school levels, and how does good comprehension instruction at these levels differ for the various content-area domains?

- What does comprehension instruction look like when students are taught to use the text in domain-specific ways (e.g. to use science texts to support scientific inquiry, or to take a historiographer's approach to historical materials)?
- What features of classroom instruction, including writing, peer discussion, multimedia and interest-based text, make content area reading and materials more relevant to students?

2.6 Instructional Responses to Diversity

Many of the curriculum questions previously raised also may be applicable to the reading comprehension instruction of students from diverse linguistic and cultural backgrounds. However, there also are specific instructional questions that need to be addressed. The reading performance data for students from diverse linguistic and cultural backgrounds illustrate the need to focus on these students' reading comprehension. Our assessment of activities, materials, and

DRAFT

- 29 -

instructional practices for these students needs to be based on what we know about cultural and linguistic diversity and the students' current and previous educational experiences.

Overarching Question: What specific instructional activities, materials, and practices are related to effective comprehension and engagement of students from various cultural and linguistic backgrounds?

- How can school-initiated experiences, related to the enhancement of students' world knowledge, lead to improvements in reading comprehension?
- What is the effect of using students' cultural, home and community knowledge on their reading comprehension?
- What type of comprehension instruction is needed in the first and second language for bilingual students?
- What instructional activities and practices promote comprehension for speakers of nonstandard dialects?
- How can changes in curriculum and practice address gaps in reading comprehension among diverse groups?

2.7 Sources of Poor Reading Comprehension

With adequate instruction, most children will experience success and problems with reading comprehension will be prevented. However, given the evidence for intra- individual and inter-individual variation in learner characteristics and the broad range of environments in which children develop, it is not surprising that some children do not acquire adequate reading comprehension skills. These characteristics can include learner characteristics, text characteristics, social variables, and instructional variables. It is important to recognize that the sources of poor reading comprehension cut across ethnic, sociocultural, and organizational levels of analysis. Regardless of the source, it is important to conduct research with children and adults who experience difficulty with reading comprehension in order to identify the barriers to skilled reading and to begin to develop remedial interventions that improve reading comprehension. Some of the important research questions in these areas are exemplified below:

2.7.1 Learner Characteristics. How do learner characteristics impact students' level of reading comprehension?

- oral language characteristics (e.g., phonology, morphology, syntax, vocabulary)

DRAFT

- 30 -

- awareness of language structures (syntactic awareness, pragmatic awareness, concept of word as a unit of form, sensitivity to word meanings, awareness of discourse patterns)
- nonlinguistic abilities and processes (e.g., attention, visualization, inferencing, reasoning)
- affective and motivational factors
- social, cultural, and home background

What types of compensatory strategies do poor comprehenders use that impact reading comprehension positively or negatively?

2.7.2 Social, Interpersonal, and Interactional Variables. What is the effect of the social climate and patterns of interaction in and out of classrooms on the reading comprehension of struggling readers? (How does the social organization of the classroom, e.g., group size and established interaction patterns, influence struggling readers' willingness to engage in learning from subject matter texts?)

2.7.3 Instructional Variables. What are the school level variables, policies and instructional practices and programs (regular, compensatory, and supplementary) that have an impact on the reading of poor comprehenders?

What are the effects of classification practices and special educational programming on the development of functional literacy and reading comprehension skills?

Are the instructional practices that appear to be effective for native English speakers also effective for children from more diverse linguistic and cultural backgrounds?

To what extent are teachers able to individualize instruction effectively to meet the needs of individual students, especially poor comprehenders?

2.7.4 Text Characteristics. How is the reading comprehension ability of poor comprehenders affected by the nature of the texts they are asked to read? In particular, what are the effects of genre, including electronic/hypertext/multimedia, diversity of texts, difficulty levels, predictability, decodability, and vocabulary?

How is the reading comprehension ability of students affected by the nature of the texts they listen to? In particular, what are the effects of genre, difficulty level, vocabulary diversity, and discourse structure?

DRAFT

- 31 -

2.8 Teacher Education, Professional Growth, and Institutional Structures and Policies

Teachers who have more professional education (preservice and inservice) are more likely to use teaching practices that are associated with higher reading achievement. Teachers need a strong understanding of theory and research about reading comprehension on which to base instructional decisions, and they need familiarity with ways to embed reading comprehension instruction into a broad array of activities. They need to know how to select specific instructional practices in a fashion that is sensitive to student needs and appropriate to the affordances of the materials available.

Effecting change in instruction also presupposes knowing a good deal about the organization of schools, about educational policy, and about the impact of assessment on curriculum and instruction. We need more understanding of the links between teacher education and practice, and how the links might lead to greater student comprehension in reading. More specifically, the following questions need to be addressed:

Overarching Question: What are effective ways of bringing about changes in policy and educational practice to promote improved comprehension?

- What should be the content of preservice instruction for teaching reading comprehension?
- What are the effects of different types of practical experiences on preservice teachers' comprehension instruction?
- How do standards for teaching, performance assessments, and incentives affect teacher practice and lead to improved student comprehension?
- What are the school level variables, policies, and instructional programs (regular, compensatory, and supplementary) that have an impact on students' reading comprehension?
- What types of professional development for in-service teachers lead to improved reading comprehension instruction?

DRAFT

-32-

3.0 STRATEGIES FOR DEVELOPING A RESEARCH PROGRAM ON READING COMPREHENSION

This report was designed explicitly to serve as a foundation for conversation and consultation with the field of reading researchers, in order to generate a broad base of input to any OERI funded research effort. It is clearly premature to specify a list of research questions or to rank order research topics based on the thinking in this document. Nonetheless, the RRSB recommends that some large-scale, basic descriptive research efforts be considered. For example, it would be helpful in undertaking future, more targeted research, to have descriptive information concerning what teachers' knowledge base related to comprehension really is. Related to this topic is the equally important question what gets taught in preservice programs about reading comprehension. We have some information from the NAEP about how students of different ages and social groups perform on certain tasks, but expanding the variety of tasks assessed would be of value. Similarly, NAEP provides some basic descriptive information about instructional conditions, but the richness of that database could be vastly expanded, to provide better information concerning what kinds of policies and programs focused on reading comprehension are currently in place in U.S. schools. It is worth thinking about how NCES might help provide some of this basic descriptive information.

We recognize as well that defining issues of intellectual challenge and practical importance is only one task in trying to formulate a research program. In this section of the report, then, we consider some additional prerequisites, issues of infrastructure and methodology that have to be addressed, further considerations on the basis for priority setting, and the next steps that need to be undertaken.

3.1 Prerequisites to Establishing a Research Program

OERI's goal is to present a research program that instantiates high quality and displays high utility. If OERI is to meet this goal, it must first (together with other representatives of the education research community) address widespread doubts concerning the quality and relevance of educational research, and address specific complaints concerning the credibility of OERI's research initiation and management efforts.

Of course, educational research is not all bad, nor is medical research, with which it is often perniciously compared, all good. In any case, given its limited funding, OERI has little influence over the vast majority of educational research. The task for OERI is to select and support very high quality efforts within educational research, and to demonstrate not just the

DRAFT – Released for Discussion Purposes Only

DRAFT

- 33 -

intellectual credibility but also the practical utility of that research. We suggest that at least three steps be taken, in the field of reading research, to promote that effort:

3.1.1 Developing a community of researchers. Research relevant to reading comprehension has been carried out within a variety of disciplines (linguistics, sociolinguistics, discourse processing, anthropology, psychology, cognitive science) and by individuals working in quite distinct fields. Furthermore, the field of reading itself is sociologically somewhat complex, as emblemized by the existence of different organizations of reading researchers (International Reading Association, National Reading Conference, Society for the Scientific Study of Reading) with only partially overlapping membership, and of strong constituencies of reading researchers within other organizations (American Educational Research Association, Society for Text and Discourse). Making progress in reading comprehension research will require creating links across the now distinct subfields and subgroups. We suggest below that a revised proposal review procedure can contribute substantially to the task of forming a community of reading researchers linked by their common intellectual focus.

3.1.2 Developing a community of researchers and practitioners. The challenge of reading comprehension is intrinsically a practical challenge, and reflective practitioners represent a source of knowledge that is insufficiently represented in the journals or the research proposals. If work on reading comprehension is to have an impact on practice within our lifetimes, then the concerns of practitioners need to be incorporated from the beginning, and the work must be seen as operating in Pasteur's quadrant⁷ rather than being exported to schools after the papers are published. Mechanisms for incorporating practitioner expertise into the research process need to be developed and nurtured.

3.1.3 Mechanisms for developing the infrastructure needed to select and manage the research. We discuss specifics of the infrastructure OERI will need in the next section. However, procedures for getting from here to there also need to be in place. This includes decisions about how requests for proposals will be researched and written, about who will serve on review panels, about how the accumulation of research findings will be monitored to serve as input to later requests for proposals, and so on.

⁷ Pasteur's quadrant refers to the quadrant of research defined by simultaneous contribution to basic and applied problems. Pasteur's contributions to the understanding of infection and contamination constituted theoretical breakthroughs even as they also formed a basis for fighting disease and promoting public health.

DRAFT

- 34 -

3.2 The OERI Infrastructure

To ensure that the OERI initiative in reading comprehension research is successful, several infrastructure issues must be addressed. Concerns about the quality of the research funded by OERI, its review procedures, and the oversight of projects in the field are widespread. The RRSg notes that OERI has aggressively attempted to address these issues in recent years. There has been a clear effort to prioritize the research agenda despite the fact that the budget specifically devoted to research and independent of funding for Centers and the regional labs is relatively small, particularly compared to other federal research entities. The effort to extend these resources by collaborations with other federal research entities through, for example, the Interagency Education Research Initiative (IERI) and the Bilingual Research initiative have enhanced the OERI research mission and reflect judicious use of resources by all the agencies involved in these efforts. Review procedures are being addressed by OERI, but a major organizational issue is that OERI personnel are expected to handle many non-research tasks. This makes the oversight of research and the management of review difficult to handle, since any individual often has multiple responsibilities within OERI.

In order for this initiative to be successful, the RRSg recommends that steps be taken to insulate the research functions of OERI from the broader dissemination and management issues that OERI and the Department of Education are required to address. A position should be established for someone who would direct this initiative and related reading research projects within OERI. The person in this position should be expected to interact and collaborate with individuals in other federal research entities involved with reading research. The person should interact with the field, assist in the development of proposals, and help synthesize the knowledge base that will emanate from this and other federally sponsored reading research initiatives. This person should not be responsible for review. The recommendations for peer review developed by the OERI Advisory Board should be fully implemented, particularly those related to peer review and research management. As part of this implementation, OERI should draft criteria for evaluating research proposals and develop procedures for training reviewers and evaluating the quality of reviews. A standing review panel with staggered, longer-term appointments should be established that includes expertise reflective of the diversity of research projects and methodologies that this initiative is likely to attract. Creating this committee will help establish continuity in review as well as possibly providing an advisory component to the OERI reading research program. This approach to review will provide considerable feedback to investigators in the field, thus contributing to enhanced research expertise. By virtue of the diversity of expertise on the panel, collaborations among researchers with different perspectives will be encouraged that will lead to the integration of knowledge across sub disciplines essential to the advancement

DRAFT

- 35 -

of knowledge about reading and instruction. No reviewer should be appointed to this panel without training and a trial period on the committee. Individuals with limited independent research experience should not be placed on the committee, and procedures for terminating a reviewers who fail to discharge their responsibilities should be established.

Prior to the solicitation of research proposals, it is crucial that the research mission of OERI be affirmed. This implies that research programs at OERI be given high priority, and insulated from organizational or logistical interference. Furthermore, OERI will need to emphasize the importance within its overall research mission of this specific initiative to develop a research base of scientific knowledge about reading comprehension.

Once a reading comprehension agenda is established, research should be solicited in a variety of formats, guided by the nature of the problems under investigation. Solicitations should reflect a long-term plan with short-term and long-term goals. There should be continuity in the crafting of these solicitations, reflecting for example feedback on the success of earlier solicitations, and accumulation of knowledge about the research agenda established. The solicitations should reflect an attempt to coordinate with the efforts of other agencies and initiatives, with a focus on a component of the overall research agenda that is specific to OERI and with which OERI is specifically identified. Although field-initiated research should continue to receive support, it is critical that the OERI take the lead in facilitating high quality reading comprehension research through carefully crafted initiatives that reflect the priorities identified in this report and the emerging body of knowledge about reading comprehension that will emerge from this initiative. Different types of grants should be supported, including grants that support multiple connected projects around coherent central themes with collaborations across investigators that are of sufficient scale to address the complex issues involved in research on reading comprehension. To develop a cadre of investigators capable of high quality research, the RRSg specifically recommends that research training fellowships and developmental grant programs for young investigator be created.

3.3 Methods Appropriate to the Task: Research Methodologies

The RRSg considered at length the issue of methodologies necessary to address the research questions identified by the committee. There was consensus among the committee that a range of methodologies was not only necessary, but was essential to ensuring rigorous evaluation of the various research questions. A particular research study may involve a combination of different types of approaches and different types of data requiring the need to adhere to multiple evidentiary standards. In the interest of rigor, it is imperative that the methodology selected to address a research question be driven by the question itself and not by

DRAFT

- 36 -

arbitrary judgments that some methods are stronger than others. For that matter, it is also not possible to make clear-cut divisions across types of methodologies, for a number of reasons:

- classes of methodologies overlap to a large extent
- there is no intrinsic ranking of values associated with any particular methodology
- high levels of rigor can be defined for any form of disciplined inquiry, whether classified as qualitative or quantitative.
- methodologies can only be assessed with reference to the research questions they are being used to answer

Among quantitatively oriented studies, true experiments, of course, represent an ideal methodology for assessing impact of instruction or intervention. True experiments are sometimes not feasible, though, since their successful implementation requires a set of conditions that cannot always be met in educational settings. In these cases, well-controlled quasi-experiments provide a standard of evidence that, while not as high, is acceptable.

Quantitative studies, including program evaluations, are typically enriched by the inclusion of methods that simultaneously provide descriptive and correlational data on, for example, the interaction of learner characteristics and response to intervention. Similarly, some methodologies that are qualitative and observational may have strong quantitative components, such as the observation and coding of classroom teaching behaviors in a time-by-activity framework essential to evaluating the effects of instructional strategies on student achievement. Some questions call for ethnographic methods, e.g., how the introduction of a new intervention addressing reading comprehension into a school is responded to by teachers and principal. Qualitative methods are often the most appropriate ones when the goal is discovery. For example, in depth qualitative studies on bilingual students' use of metacognitive and cognitive strategies while reading in two languages have generated information on their reading that would have been difficult to obtain otherwise. Qualitative methods are also highly desirable when in-depth information is needed about important components of an intervention's functioning. Such information may illuminate, for example, whether the intervention is likely to be undermined or supported within a school. In addition, qualitative methods are useful in providing a cultural perspective on why certain groups respond the way they do to instruction, or in describing how teachers' practices differentially affect students' reading engagement and performance.

Thus, scientifically rigorous research studies use methods appropriate to the research questions of interest. In many instances, multiple methodologies are used that blend descriptive, correlational, and experimental methods in the more quantitative area with a range of qualitative

DRAFT – Released for Discussion Purposes Only

DRAFT

- 37 -

methods essential to addressing the questions of interest. It is also possible that the appropriate methodology of interest will be predominantly one or another type, though there is substantial variability in the characteristics of a single methodology that defy simple lumping of methods into categories.

Science is essentially evidence-based. When multiple types of evidence can be cited in support of a particular conclusion, there is greater capacity for building consensus, ensuring the translation of research to practice, and supporting the sustainability of research-based practices.

3.3.1 Summary. It is to be hoped that one aspect of this research agenda will be to increase the receptivity of educational thinking to the value of rigorous research, and to stimulate active discussion of research methods and their appropriate application. A program of research, especially one structured across several years, is ideally characterized by procedures to guide selection of questions through a process of setting research priorities, as well as to ensure replication of findings, deepening of understandings, charting of progress, and assessment of the degree of convergence across studies and research methods. The research program proposed here on reading comprehension should be a model for the effective choice and use of appropriate and diverse methods.

3.4 Procedures for Establishing Research Priorities

The RRSB did not attempt, within the constraints of its limited time, to take on the challenge of establishing a prioritized list of research undertakings. Rather, we considered our role one of defining a general area of research, and sketching within that area some of the parameters that might help determine a specified research agenda in the future. It is clear, furthermore, that the specifics of that agenda should be informed by comments and reactions from a group much larger and more broadly representative than the one that drafted this report.

Members of the RRSB all formulated their own lists of pressing problems and urgent research questions. Those problems and questions became one basis for our discussions. An additional basis was the emergent model of reading comprehension sketched here, and an inventory reflecting:

What basic research knowledge was available about each of the various components, outcomes, and sources of learner differences identified as defining reading comprehension, and how much if any of that research knowledge was being put to use in influencing practice?

Our deliberations were greatly informed by a grid (Figure 2), alternately represented as a cube (Figure 3), that located various topics in a space defined by a) the richness of the research base, b) the extent to which current practice is reflective and informed, and c) how much is known about

DRAFT

- 38 -

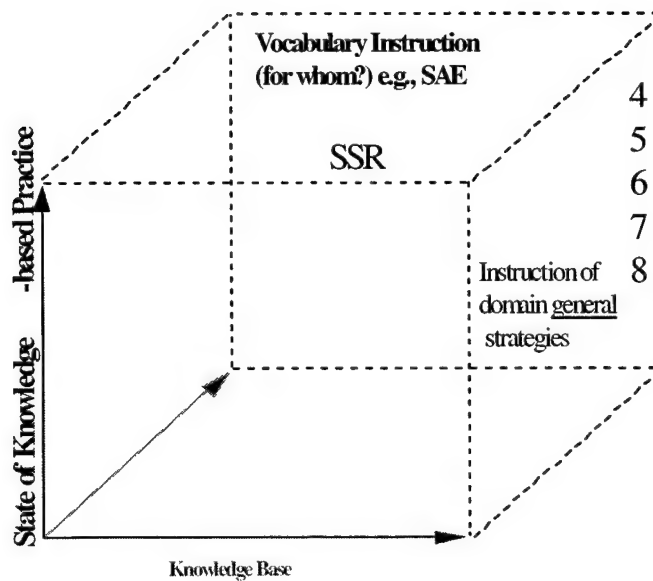
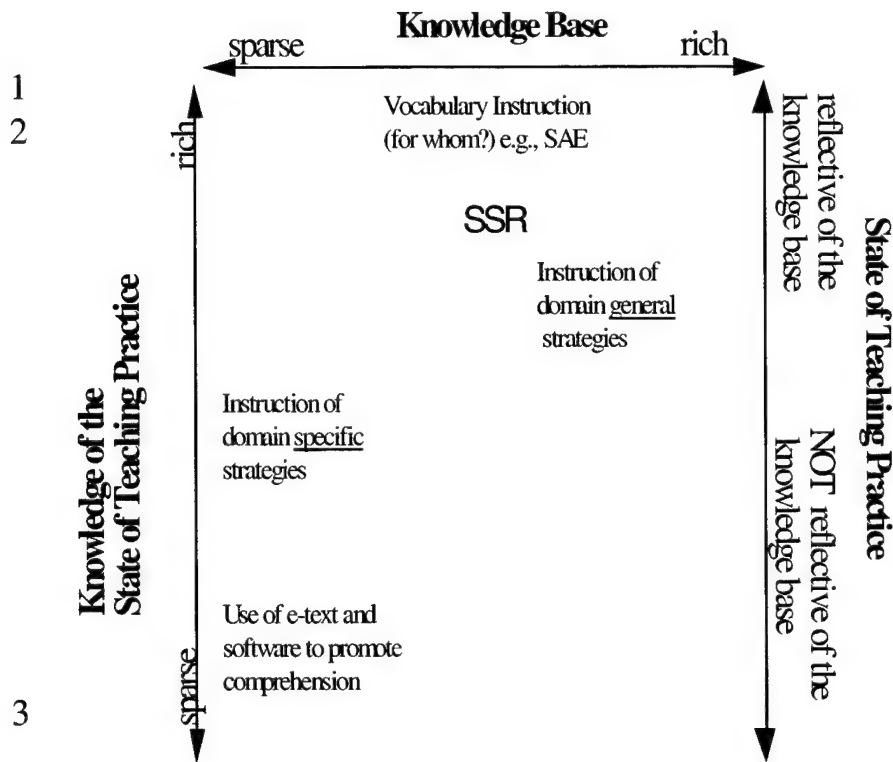
relevant practice. Those figures were a useful heuristic in identifying the implications of the location of any particular topic. For example, a topic such as the relevance of discourse knowledge to comprehension, which is informed by a rich knowledge base but minimally incorporated into practice, is ripe for “implementation research” designed to develop an understanding of how the research knowledge might be incorporated into curriculum, into teacher development, or in another way introduced into the classroom. Another topic (e.g., role of vocabulary) might have a rich basis of knowledge from research and a relatively rich basis of knowledge concerning procedures for implementation, but still relatively little implementation in the average classroom; such a topic might be identified as appropriate for quasi-experimental or experimental evaluation of instructional interventions in classroom or whole-school settings. Yet another topic important to reading comprehension but which has been only minimally researched (e.g., integration of nonprint and print media in comprehension) might be simultaneously tackled with basic experimental research and with exploratory methods applied in classrooms. In other words, when the knowledge base is impoverished and the potential for relevance to practice very high, the research priorities should be focused on simultaneously expanding the knowledge base while exploring practice options.

The grid and cube were used repeatedly by the RRSg as a heuristic in trying to decide how to characterize various specific research topics. The priorities ultimately determined reflected decisions about the various dimensions identified, as applied to topics and to questions. The research topics (status of the components, outcomes, and learner differences) were judged on the following criteria:

- The richness of the knowledge base in its current state
- The importance of expanding the knowledge base
- The importance of exploring instructional applications.

The research questions presented in the second half of this document, on the other hand, were judged based on:

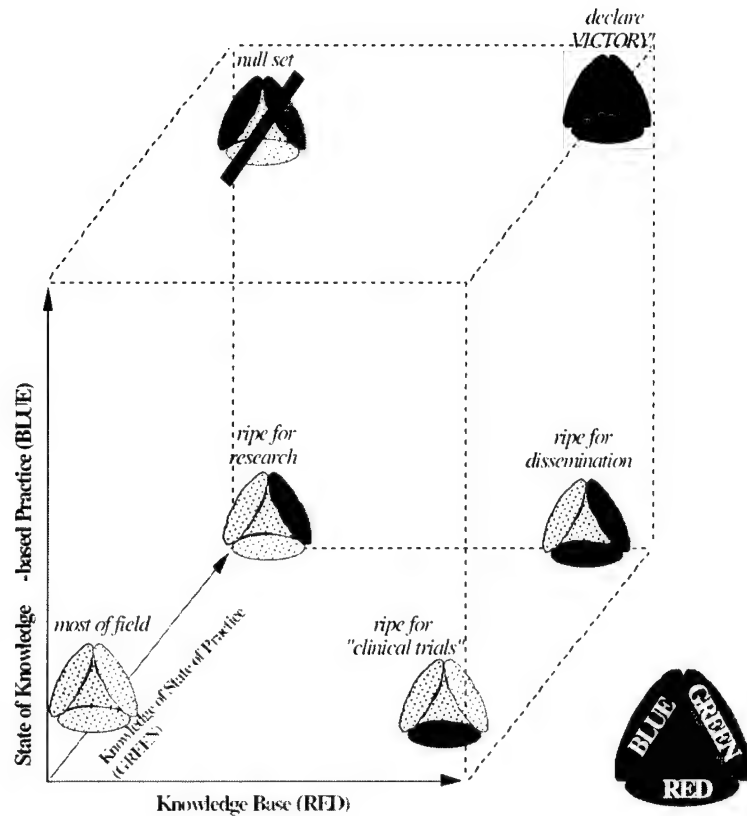
- The richness of the knowledge base
- The extent to which relevant applications were already deployed



- Use of e-text and software to promote comprehension
- Knowledge of State of Practice
- Instruction of domain specific strategies

Figure 2. Knowledge Base/Teaching Practice Grid

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Figure 3. Knowledge Base/Teaching Practice Cube

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These judgments are reflected in the descriptions provided of the dimensions of our reading comprehension model, and in our specification of research questions.

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Obviously any proposed research program represents a compromise between focus and breadth. We have chosen for breadth, relying that reactions from our colleagues will form a crucial resource when it comes to making decisions about how to focus more narrowly on research priorities. But it may be helpful to readers to note a number of points that arose in our deliberations as we tried to establish priorities:

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DRAFT

- 41 -

236 3.4.1 Tension between a focus on 'postprimary' and inclusion of a wider age range. We
237 discussed at some length the value of focusing our questions more specifically on a particular
238 age range, e.g., grades three through five or six, on the grounds that this is where practitioners
239 are most concerned with effective reading comprehension instruction. We chose not to limit the
240 age range of interest for a number of reasons. First, we did not wish to suggest that reading
241 comprehension should be ignored in reading instruction in the primary grades; many
242 accomplishments of kindergarten, grade one, and grade two readers are directly relevant to
243 current and future comprehension success. Second, we recognize the practical challenges
244 facing the content area teacher in middle and secondary school classes, and the degree to which
245 those challenges are intricately related to reading comprehension. Third, our conceptualization of
246 reading comprehension is inherently developmental, encompassing precursors that develop in
247 the preschool and primary school years as well as outcomes displayed in secondary school. This
248 conception precludes restriction of the age range of interest.

249 3.4.2 Tension between priorities derived from our analysis of research and practice, and
250 priorities determined by other factors. We recognize that there are competing priorities within any
251 research program. For example, there are priorities derived from political realities, associated
252 with the availability of fiscal and human resources, limited by the practicalities of certain kinds of
253 research undertakings, and related to the likelihood that results would actually be used to change
254 practice. The group that produced this report limited itself to thinking about what we need to
255 know. Obviously, a research agenda specified by OERI will need to incorporate the impact of
256 other factors in selecting research targets as well.

257 3.4.4 Research projects versus a portfolio of research efforts. While research priorities
258 tend to be attached to questions or problems, planning a research effort requires thinking about a
259 packet of activities that fit together and address practical as well as intellectual issues. Thus, we
260 suggest that the research planning effort consider a strategy for soliciting short term and longer
261 term projects simultaneously. Shorter-term projects could generate useful outcomes relatively
262 quickly, e.g., evaluating well-founded instructional interventions. Longer-term undertakings would
263 be designed to underpin future improvements in practice through an expansion of our basic
264 understanding of reading comprehension, e.g. planning a multi-site, large-scale longitudinal study
265 of reading comprehension.

266 3.4.5 Tension between preplanned and emergent research priorities. The RRSF
267 achieved a remarkable degree of consensus on the formulation of issues in reading
268 comprehension. It did not conclude, though, that this document should be an unfiltered basis for
269 soliciting research proposals, in part because we agreed on the need to let the quality of research
270 proposed partly determine the research priorities. Bad research on an extremely important topic

DRAFT – Released for Discussion Purposes Only

DRAFT

- 42 -

is not likely to advance the field as much as excellent research on a slightly less pressing topic. Thus, we suggest that any solicitation of proposals be formulated with enough flexibility to allow the field to demonstrate what it can do well, while maintaining sufficient focus so that a coherent research program develops.

3.4.6 Need to focus on OERI's competitive advantage. While it is tempting to think about research priorities in the broadest possible way, we also were aware of our brief to advise OERI about its research undertakings. The program of reading research that OERI undertakes should fit into the larger context of research on reading in the U.S. There are robust efforts, funded in large part through National Institute of Child Health and Human Development (NICHD), focused on initial reading instruction. The Office of Bilingual Education and Minority Languages Affairs (OBEMLA) has funded an initial study on bilingual readers, and NICHD together with OERI has launched a substantial effort focused on analyzing transfer from Spanish to English reading. The Interagency Education Research Initiative (IERI), funded jointly by the National Science Foundation (NSF), OERI, and NICHD, is funding efforts that bring early research to scale with some emphasis on the use of technology. Thus, the reading research program that OERI eventually decides on should seek to fill gaps left by the existent research efforts, while being coherently organized around a central set of issues facing practitioners.

3.5 Next Steps

This document will be disseminated in a number of ways and modified through a number of channels:

Websites: The full document will be made available through appropriate websites, together with an email address to which comments can be sent.

Conferences: Members of the RRSg will summarize the report, and distribute copies of it, at the major research meetings that attract reading researchers and practitioners, including NCTE, NRC, NABE, AERA, IRA, ST&D, and SSSR. Discussion at those meetings will be recorded, and again reactions will be solicited to the email address.

Shorter versions: After the initial comments from RRSg members are processed, an executive summary will be written and distributed. The summary will focus on the rationale for the initiative and the steps to be taken, presenting only a non-technical version of the reading comprehension model.

DRAFT

- 43 -

303 Longer versions: If members of the RRSg wish to undertake elaboration of the reading
304 comprehension model, they might develop a longer publication, that
305 could serve as a background resource and support to OERI's efforts to
306 produce requests for proposals.

307 Conference: The RAND/OERI planning effort for reading will include a conference,
308 possibly to be held in June 2001 that will serve as a first step in
309 building the community of reading comprehension researchers. At this
310 meeting the RRSg members will process feedback and produce a final
311 version of their report.

DRAFT

-44-

APPENDIX A: CRITERIA FOR A COMPREHENSIVE AND THEORETICALLY GROUNDED ASSESSMENT SYSTEM

Capacity to reflect authentic outcomes. While any particular assessment may not reflect the full array of outcomes, the inclusion of a wider array than currently tested is crucial.

Congruence between assessments and the processes/components. For many purposes, assessments need to target particular components of comprehension in the interest of revealing individual differences in given components that might inform our understanding of the comprehension process as well as individual differences on measures of comprehension.

Developmental sensitivity. Any assessment system needs to be sensitive across the full developmental range of interest.

Capacity to provide for the identification of individual children as poor comprehenders. An effective assessment system should be able to identify individual children as poor comprehenders, not only in terms of pre-requisite skills such as fluency in word identification and decoding, but also in terms of cognitive deficits and gaps in relevant knowledge (e.g. background, domain specific etc.) that might adversely affect reading and comprehension, even in children who have adequate word level skills. It is also critically important that such a system provide for early identification of children who are apt to encounter difficulties in reading comprehension because of inadequacies in one or another component of comprehension.

Capacity to identify subtypes of poor comprehenders. The model of reading comprehension outlined earlier makes it clear that this ability is complexly determined. It therefore follows that comprehension difficulties could come about because of deficiencies in one or another of the components of comprehension specified in the model. Thus, an effective assessment system should have the means for identifying subtypes of poor comprehenders in terms of the components and desired outcomes of comprehension, and both intra and interindividual differences in acquiring the knowledge and skills necessary for becoming a good comprehender.

Instructional sensitivity. A major purpose for assessments is to inform instruction, and to reflect the impact of instruction or intervention. Thus, an effective assessment system should not only provide important information about a child's relative standing in appropriate normative populations, (school, state, and/or national norms groups), but it should also provide important information about a child's relative strengths and weaknesses for purposes of educational planning.

DRAFT – Released for Discussion Purposes Only

DRAFT

- 45 -

33 Openness to intra-individual differences. Understanding the performance of an individual
34 often requires attending to differences in performance across tasks.

35 Utility for instructional decision-making. Assessments can inform instructional practice if
36 they are designed to identify domains that instruction might target (i.e., components), rather than
37 providing summary scores useful only for comparison with other learners' scores.

38 Validity across social, linguistic, and cultural variation. Good tests of reading
39 comprehension will target authentic outcomes and reflect component processes. If performance
40 on the task reflects differences due to social, linguistic, or cultural variation that are not directly
41 related to reading comprehension performance, then the tests are inadequate for purposes of the
42 research agenda proposed here.

APPENDIX B: BIBLIOGRAPHIC RESOURCES

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DRAFT

- 47 -

APPENDIX C: RESEARCH QUESTIONS CATEGORIZED BY TOPIC*

Rand Reading Study Group Meeting

Breckenridge, CO

August 2000

ASSESSMENT

1. How do we assess reading comprehension so that we can identify poor comprehenders and possible subgroups? (revised)

2. To what extent does high-stakes assessment impact reading comprehension in poor comprehenders?

INSTRUCTION

- What does good comprehension instruction look like at different ages and reading levels in terms of activities, materials, and practices?
- What are the instructional activities that promote comprehension of text? (strategy instruction, questioning the author, what else?)
- What practices and activities promote long-term transfer and independent use of cognitive strategies?
- What is the effect of reader-response type of instruction on comprehension?
- What is the effect of long-term *project* learning on comprehension?
- What difference does reading aloud make in reading comprehension over time? (Does it make a difference by fourth grade?)
- What are the short and long term consequences of instruction in metalinguistics and listening on young learners (prek-grade 2)?

* Drawn from Appendix D: Research Questions Generated at Breckenridge, Colorado Meeting, August 2000.

DRAFT

- 48 -

- 25 • What are the elements of vocabulary instruction that make a difference in students'
26 comprehension?
- 27 • What contribution does each of the above instructional elements make on students'
28 reading comprehension?
- 29 2. What specific instructional practices are related to effective comprehension and
30 engagement of students of diverse cultural and linguistic backgrounds?
- 31 • How helpful is building students' school-based knowledge to improvements in their
32 reading comprehension?
- 33 • What is the relationship between the identification and utilization of students' cultural
34 knowledge to their reading comprehension?
- 35 • How does decoding instruction on words not known in L2 affect L2 students' reading
36 comprehension?
- 37 • What is effective vocabulary instruction for L2 students at different ages and
38 proficiency levels?
- 39 • What types of comprehension instruction and activities work best with L2 students at
40 different ages and language proficiency levels?
- 41 • How can transfer instruction improve the reading comprehension of L2 students?
- 42 • What instructional practices promote dialect speakers' comprehension?
- 43 • What instructional practices get students from diverse backgrounds involved and
44 engaged in reading comprehension?
- 45 3. Each of the following questions are in the service of the superordinate question: How
46 can students' comprehension of content-area materials be improved at elementary, middle, and
47 high school levels in domain-specific ways?
- 48 • What role are content area materials playing in contemporary content area
49 instruction?
- 50 • What are the long-term consequences (at the middle school and high school levels)
51 of supporting students to use informational text in the primary grades?
- 52 • What instructional practices can teachers use to effectively support students in their
53 reading of content area materials?

DRAFT

- 49 -

- How can teachers be supported to evaluate content area materials for their accessibility to diverse students?
- What does comprehension instruction look like when students are supported to use the text in domain-specific ways (e.g., - when students are taught to reason with text in domain-specific ways such as to use science text to support their inquiry and take an inquiry stance to science text? to take a historiographer's approach to history text?)
- What role does writing instruction play in the comprehension of content materials and vice versa?
- What are the instructional opportunities and outcomes of peer discussion when it is situated within content area instruction?
- What role can text productively play in supporting peer discussion, and what role can peer discussion play in supporting students' reading of content area materials?
- What are effective ways of supporting the development of students' background knowledge (print, artifacts, multimedia) in a way that makes a difference in learning from content area materials?
- What are the consequences of using interest-based textual materials as a means of bridging to content area text? (Examples would include materials related to extracurricular activities)
- What are the differences between teaching students to read from content area texts vs. from primary documents? When should primary documents be introduced in the curriculum? What kinds of support do students need to make effective use of diverse forms of text (e.g., the internet)?
- What are the features of lecturing that effectively prepare students to read and learn from content area materials?
- What features of classroom climate might make content area reading and materials more relevant to students?
 - How can teachers tap into young people's non-traditional text and uses of text for the purpose of enhancing engagement and comprehension?

DRAFT

- 50 -

- 85 ○ How can students' non-traditional literacy practices be used to influence
- 86 teachers' expectations of adolescents?

87 **Instructional Variables**

- 88 1. How can teachers accommodate struggling readers' out of school interests so that in school
- 89 and out of school literacies are related?
- 90 2. Under what conditions does explicit vocabulary instruction benefit poor comprehenders?
- 91 3. Under what conditions does instruction aimed at improving fluency benefit poor
- 92 comprehenders? (Fluency includes automaticity of word recognition, fluency in decoding, and
- 93 fluency and expressiveness in reading connected text.)
- 94 4. What are the factors that contribute to loss of engagement and motivation in reading? How is
- 95 the role of these factors different for different ages and populations of students?
- 96 5. What are the effects of cognitive and metacognitive strategy instruction on comprehension in
- 97 poor comprehenders? (modified)
- 98 6. What are the effects of spelling instruction on poor readers' comprehension?
- 99 7. What types of writing instruction have a positive impact on the reading comprehension of
- 100 poor comprehenders?

101 **SOURCE OF POOR READING COMPREHENSION**

- 102 1. What are the processes and variables that go to make up skilled comprehension? How do
- 103 they interact with each other? How do they work as a system? Which one(s) contribute the
- 104 most to the overall processes of comprehension? Which one(s) are critical? What
- 105 compensatory processes affect these variables? What other processes and variables affect
- 106 comprehension variables?
- 107 2. What are the processes and variables involved in comprehension of electronic text,
- 108 multimedia text, or hypertext? How are these the same as or different from the processes and
- 109 variables involved in comprehension of conventional text?
- 110 3. What are the comprehension processes and variables involved in comprehension by learners
- 111 of English as a second language? How are they the same or different from those first
- 112 language processes and variables?

DRAFT

- 51 -

4. Are there differences in comprehension in different contexts, e.g., studying vs reading or in different genres of text, etc.? How much overlap is then among the processes necessary in different contexts?

5. What are the subgroups of poor comprehenders?

Text Characteristics

1. To what extent is poor reading comprehension affected by different types of texts, tasks and situations? What are the factors (child factors, text factors, situational factors) that make electronic/hypertext/multimedia and conventional text differentially comprehensible to poor comprehenders?

2. How does the nature of the texts which poor comprehenders are asked to read impact their reading comprehension ability (genre - including electronic/hypertext/multimedia -, diversity of texts, difficulty levels, predictability, decodability, vocabulary, etc.)? How does the nature of the texts, which students listen to affect their reading comprehension ability (genre, difficulty level, vocabulary, diversity)?

Learner Characteristics

1. How do learner characteristics impact students' level of reading comprehension?

- Oral language characteristics (e.g.- phonology, morphology, syntax, vocabulary)
- Awareness of language structures (syntactic awareness, pragmatic awareness, concept of word as a unit of form, sensitivity of word meanings)
- Nonlinguistic abilities and processes (e.g., attention, visualization, inferencing, reasoning)
- Affective and motivational factors
- Social, cultural, and home background

2. What types of compensatory strategies do poor comprehenders use that impact reading comprehension positively or negatively?

Social, Interpersonal, and Interactional Variables

1. What is the effect of the social climate and patterns of interaction in and out of classrooms on the reading comprehension of struggling readers? (with special consideration for subject matter text)

DRAFT

- 52 -

2. What kinds of interactional patterns enhance or diminish struggling readers' comprehension of subject matter text?

TEACHER EDUCATION & PROFESSIONAL GROWTH

1. Teacher Education: What are the various models of teacher education and forms of teacher support that promote high-level comprehension instruction? What do we know about the efficacy of these models and forms of support? How should these models be differentiated across teachers with different years of experience?

- What are the relationships among teacher's knowledge about reading comprehension, enactment of high-quality comprehension instruction and actual students' comprehension?
- What knowledge base do teachers need to have to make principled decisions regarding reading comprehension instruction?
- What are effective models of bringing about changes in educational practice (instruction, administration, policy) to promote improved comprehension?

What we know:

Teachers who have more professional training (including preservice and inservice) are more likely to use teaching practices that are associated with higher reading achievement on NAEP Student outcomes are highly correlated with teacher training.

We know that one-shot, short-term inservice programs are not effective.

What we don't know:

Preservice

There aren't any studies to link preservice teacher education in reading comprehension to student performance. We need to know which components of preservice instruction lead to improved student comprehension. We need answers to these questions:

What do we know about the content and experiences relative to reading comprehension that are part of the teacher education curriculum (i.e., methods courses in reading and language arts, science, math, social studies)?

- What kinds of field experiences best promote reading comprehension instruction?

DRAFT

- 53 -

- 171 • What do we know about the knowledge base of the instructors of courses involving
- 172 reading comprehension?
- 173 • What do we know about the background knowledge and the quality of field
- 174 supervision?
- 175 • What do we know about the most beneficial field placements?

176

177 **Inservice**

178 We know very little about the duration and intensity of inservice (professional
179 development) that lead to improved student comprehension. What little research exists is
180 descriptive in nature. Longitudinal studies are needed that indicate what kinds of instruction lead
181 to sustained effects in reading comprehension. We need answers to these questions:

- 182 • What support is needed for beginning teachers of reading comprehension?
- 183 • What are the kinds and qualities of on-going teacher development that lead to
- 184 improved instruction in reading comprehension?
- 185 • How much does inservice training in reading comprehension affect teacher practice
- 186 and lead to improved student comprehension?

187 **INSTITUTIONAL STRUCTURES & POLICY**

188 **School organization and policy variables**

- 189 1. What are the school level variables, policies and instructional programs (regular,
190 compensatory, and supplementary) that have an impact on the reading of poor
191 comprehenders?
- 192 2. What are the effects of classification practices and special educational programming on the
193 development of functional literacy and reading comprehension skills?

DRAFT

-54-

APPENDIX D: RESEARCH QUESTIONS GENERATED AT BRECKENRIDGE, COLORADO MEETING IN AUGUST 2000

Group 1 Question Prioritization

Question 1

What are the processes and variables that go to make up skilled comprehension? How do they interact with each other? How do they work as a system? Which one(s) contribute the most to the overall processes of comprehension? Which one(s) are critical? What compensatory processes affect these variables? What other processes and variables affect comprehension variables?

- This is a top priority.
- This is very relevant to the mission of the panel.
- Broad but important
- There are major holes in our knowledge.
- This question relates too much of the remaining work of the panel.

Question 2

What are the processes and variables involved in comprehension of electronic text, multimedia text, or hypertext? How are these the same as or different from the processes and variables involved in comprehension of conventional text?

- This is a top priority.
- This is very relevant to the mission of the panel.
- Broad but important
- There are major holes in our knowledge.
- This question relates too much of the remaining work of the panel.

DRAFT

- 55 -

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Group 1 Question Prioritization

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27 Question 3

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What are the comprehension processes and variables involved in comprehension by learners of English as a second language? How are they the same or different from those first language processes and variables?

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- This is a top priority.

32

- It's in our territory.

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- Broad but important

34

- There are major holes in our knowledge.

35

- This question relates to much of the remaining work of the panel

36

37 Question 4

38

Are there differences in comprehension in different contexts, e.g., studying vs reading or in different genres of text, etc.? How much overlap is then among the processes necessary in different contexts?

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40

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- This is a top priority.

42

- It's in our territory.

43

- Broad but important

44

- There are major holes in our knowledge.

45

- This question relates to much of the remaining work of the panel

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DRAFT

- 56 -

Group 2 Question Prioritization

1. What does good comprehension instruction look like at different ages and reading levels in terms of activities, materials, and practices?

Priority 4

Knowledge 3

Practice 2

- What are the instructional activities that promote comprehension of text? (strategy instruction, questioning the author, what else?)
- What practices and activities promote long-term transfer and independent use of cognitive strategies?
- What is the effect of reader-response type of instruction on comprehension?
- What is the effect of long-term project learning on comprehension?
- What difference does reading aloud make in reading comprehension over time? (Does it make a difference by fourth grade?)
- What are the short and long term consequences of instruction in metalinguistics and listening on young learners (prek-grade 2)?
- What are the elements of vocabulary instruction that make a difference in students' comprehension?
- What contribution does each of the above instructional elements make on students' reading comprehension?

2. What specific instructional practices are related to effective comprehension and engagement of students of diverse cultural and linguistic backgrounds?

Priority 4

Knowledge 2

Practice 1.5

- How helpful is building students' school-based knowledge to improvements in their reading comprehension?

DRAFT

- 57 -

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Group 2 Question Prioritization

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- What is the relationship between the identification and utilization of students' cultural knowledge to their reading comprehension?

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- How does decoding instruction on words not known in L2 affect L2 students' reading comprehension?

81

82

- What is effective vocabulary instruction for L2 students at different ages and proficiency levels?

83

84

- What types of comprehension instruction and activities work best with L2 students at different ages and language proficiency levels?

85

86

- How can transfer instruction improve the reading comprehension of L2 students?

87

- What instructional practices promote dialect speakers' comprehension?

88

- What instructional practices get students from diverse backgrounds involved and engaged in reading comprehension?

89

90

3. Each of the following questions are in the service of the superordinate question: How can students' comprehension of content-area materials be improved at elementary, middle, and high school levels in domain-specific ways?

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Priority	4
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Knowledge	2
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Practice	1.5
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- What role are content area materials playing in contemporary content area instruction?

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- What are the long-term consequences (at the middle school and high school levels) of supporting students to use informational text in the primary grades?

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- What instructional practices can teachers use to effectively support students in their reading of content area materials?

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- How can teachers be supported to evaluate content area materials for their accessibility to diverse students?

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DRAFT

- 58 -

Group 2 Question Prioritization

- What does comprehension instruction look like when students are supported to use the text in domain-specific ways (e.g., - when students are taught to reason with text in domain-specific ways such as to use science text to support their inquiry and take an inquiry stance to science text? to take a historiographer's approach to history text?)
- What role does writing instruction play in the comprehension of content materials and vice versa?
- What are the instructional opportunities and outcomes of peer discussion when it is situated within content area instruction?
- What role can text productively play in supporting peer discussion, and what role can peer discussion play in supporting students' reading of content area materials?
- What are effective ways of supporting the development of students' background knowledge (print, artifacts, multimedia) in a way that makes a difference in learning from content area materials?
- What are the consequences of using interest-based textual materials as a means of bridging to content area text? (Examples would include materials related to extracurricular activities)
- What are the differences between teaching students to read from content area texts vs. from primary documents? When should primary documents be introduced in the curriculum? What kinds of support do students need to make effective use of diverse forms of text (e.g., the internet)?
- What are the features of lecturing that effectively prepare students to read and learn from content area materials?

DRAFT

- 59 -

Group 2 Question Prioritization

- What features of classroom climate might make content area reading and materials more relevant to students?
 - How can teachers tap into young people's non-traditional text and uses of text for the purpose of enhancing engagement and comprehension?
 - How can students' non-traditional literacy practices be used to influence teachers' expectations of adolescents?

4. Teacher Education: What are the various models of teacher education and forms of teacher support that promotes high-level comprehension instruction? What do we know about the efficacy of these models and forms of support? How should these models be differentiated across teachers with different years of experience?

Priority 4

Knowledge 2

Practice 1

- What are the relationships among teacher's knowledge about reading comprehension, enactment of high-quality comprehension instruction and actual students' comprehension?
- What knowledge base do teachers need to have to make principled decisions regarding reading comprehension instruction?
- What are effective models of bringing about changes in educational practice (instruction, administration, policy) to promote improved comprehension?

What we know:

Teachers who have more professional training (including preservice and inservice) are more likely to use teaching practices that are associated with higher reading achievement on NAEP Student outcomes are highly correlated with teacher training.

We know that one-shot, short-term inservice programs are not effective.

DRAFT

- 60 -

Group 2 Question Prioritization

What we don't know:

Preservice

There aren't any studies to link preservice teacher education in reading comprehension to student performance. We need to know which components of preservice instruction lead to improved student comprehension. We need answers to these questions:

- What do we know about the content and experiences relative to reading comprehension that are part of the teacher education curriculum (i.e., methods courses in reading and language arts, science, math, social studies)?
- What kinds of field experiences best promote reading comprehension instruction?
- What do we know about the knowledge base of the instructors of courses involving reading comprehension?
- What do we know about the background knowledge and the quality of field supervision?
- What do we know about the most beneficial field placements?

Inservice

We know very little about the duration and intensity of inservice (professional development) that lead to improved student comprehension. What little research exists is descriptive in nature. Longitudinal studies are needed that indicate what kinds of instruction lead to sustained effects in reading comprehension. We need answers to these questions:

- What support is needed for beginning teachers of reading comprehension?
- What are the kinds and qualities of on-going teacher development that lead to improved instruction in reading comprehension?
- How much does inservice training in reading comprehension affect teacher practice and lead to improved student comprehension?

DRAFT

- 61 -

186 Group 3 Question Prioritization

187

188 Scales:

189 Priorities

190 4. Top priority

191 3. Definitely include

192 2. Maybe / questionable

193 1. Definitely exclude

194 Knowledge

195 4. Solid knowledge base

196 3. Emerging knowledge base

197 2. Promising findings

198 1. We don't know very much yet

199 Definition and Classification

200 1. How do we assess reading comprehension so that we can identify poor comprehenders and
201 possible subgroups? (revised)

202 Priority 4

203 Knowledge 2

204 2. What are the subgroups of poor comprehenders?

205 Priority 1 (because it's subsumed under Questions 1 and 5)

206 Knowledge 2

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DRAFT

- 62 -

207 Group 3 Question Prioritization

208 Text Characteristics

209 1. To what extent is poor reading comprehension affected by different types of texts,
210 tasks, and situations? What are the factors (child factors, text factors, situational factors) that
211 make electronic/hypertext/multimedia and conventional text differentially comprehensible to poor
212 comprehenders?

213 Priority 1 (because it is now subsumed under Question 4)

214 Knowledge 2

215 2. How does the nature of the texts which poor comprehenders are asked to read impact
216 their reading comprehension ability (genre - including electronic/hypertext/multimedia -, diversity
217 of texts, difficulty levels, predictability, decodability, vocabulary, etc.)? How does the nature of the
218 texts, which students listen to affect their reading comprehension ability (genre, difficulty level,
219 vocabulary, diversity)?

220 Priority 4

221 Knowledge 2

222 Learner Characteristics

223 1. How do learner characteristics impact students' level of reading comprehension?

- 224 • Oral language characteristics (e.g.- phonology, morphology, syntax, vocabulary)

225 Priority 3.8

226 Knowledge 3

- 227 • Awareness of language structures (syntactic awareness, pragmatic awareness,
228 concept of word as a unit of form, sensitivity of word meanings)

229 Priority 3

230 Knowledge 2

231

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DRAFT

- 63 -

234 Group 3 Question Prioritization

235

- 236 • Nonlinguistic abilities and processes (e.g., attention, visualization, inferencing,
237 reasoning)

238 Priority 3.5

239 Knowledge 2

240

241 Affective and motivational factors

242 Priority 3

243 Knowledge 3

244

245 Social, cultural, and home background

246 Priority 3

247 Knowledge 2

- 248 2. What types of compensatory strategies do poor comprehenders use that impact reading
249 comprehension positively or negatively?

250 Priority 3

251 Knowledge 2

252

253 Social, Interpersonal, and Interactional Variables

- 254 1. What is the effect of the social climate and patterns of interaction in and out of classrooms on
255 the reading comprehension of struggling readers? (with special consideration for subject matter
256 text) (revised)

257 Priority 3

258 Knowledge 2

259

DRAFT

- 64 -

Group 3 Question Prioritization

2. What kinds of interactional patterns enhance or diminish struggling readers' comprehension of subject matter text?

Priority 1 (because it is now subsumed under Question 7)

Knowledge 2

Instructional Variables

1. How can teachers accommodate struggling readers' out of school interests so that in school and out of school literacies are related?

Priority 3

Knowledge 1

2. Under what conditions does explicit vocabulary instruction benefit poor comprehenders?

Priority 4

Knowledge 3

3. Under what conditions does instruction aimed at improving fluency benefit poor comprehenders? (Fluency includes automaticity of word recognition, fluency in decoding, and fluency and expressiveness in reading connected text.)

Priority 4

Knowledge 2

4. What are the factors that contribute to loss of engagement and motivation in reading? How is the role of these factors different for different ages and populations of students?

Priority 4

Knowledge 2

5. What are the effects of cognitive and metacognitive strategy instruction on comprehension in poor comprehenders? (modified)

Priority 3

Knowledge 3

DRAFT

- 65 -

287 6. What are the effects of spelling instruction on poor readers' comprehension?

288 Priority 3

289 Knowledge 1

290 7. What types of writing instruction have a positive impact on the reading comprehension of poor
291 comprehenders?

292 Priority 4

293 Knowledge 1

294 **School Organization and Policy Variables**

295 1. What are the school level variables, policies and instructional programs (regular,
296 compensatory. and supplementary) that have an impact on the reading of poor comprehenders?

297 Priority 4

298 Knowledge 2

299 2. To what extent does high-stakes assessment impact reading comprehension in poor
300 comprehenders?

301 Priority 2

302 Knowledge 1

303 3. What are the effects of classification practices and special educational programming on the
304 development of functional literacy and reading comprehension skills?

305 Priority 4

306 Knowledge 3

DRAFT

-66-

APPENDIX E: RAND READING STUDY GROUP CAMEOS

MEMBERS

DONNA E. ALVERMANN is Research Professor of Reading Education at the University of Georgia and Professor of Reading Education. Her research focuses on adolescent literacy. Currently, she is completing data collection on a Spencer Foundation major grant that includes a 15-week intervention aimed at teaching media literacy to a group of 30 middle and high school students. From 1992-1997, Dr. Alvermann co-directed the National Reading Research Center and conducted 3 long-term studies of adolescents' perceptions of reading and learning from text-based discussions. At the start of that research program, the literature on adolescent literacy development contained very little information on what it means to be a motivated, or even disinterested, reader from an adolescent's perspective. This perspective is important because teachers generally tend to act more readily upon students' perceptions than they do upon the research and theorizing of those of us in the academy. Dr. Alvermann is past president of the National Reading Conference and served co-chair of the International Reading Association's Commission on Adolescent Literacy from 1997-2000. Currently, she is a member of the Board of Directors of the College Reading Association, the Chair of the Board of Directors of the American Reading Forum, and a co-editor of the *Journal of Literacy Research*. In 1997, she was awarded the Oscar S. Causey Award for Outstanding Contributions to Reading Research.

JANICE DOLE is currently an Associate Professor of Reading Education at the University of Utah. After several years as a primary-grade teacher, Janice completed her M. A. and Ph. D. at the University of Colorado. Subsequently, she held positions at the University of Denver, the Center for the Study of Reading at the University of Illinois at Urbana-Champaign and Michigan State University. Janice's work has appeared in the *Reading Research Quarterly*, *Review of Educational Research*, *The Elementary School Journal*, and the *Journal of Reading*. She is currently on the Reading Development Panel for the National Assessment of Educational Progress and has worked for the Research and Development section of the American Federation for Teachers for the last five years. Three years ago, Jan took a leave of absence from the University to work for the Utah State Office of Education. There she served as the Director of the Governor's Literacy Initiative for Utah, and directed a successful proposal for the Reading Excellence Act. She now serves as co-director of that project in Utah. Her current research interests include comprehension instruction at the K-3 level and reading professional development for K-3 teachers in at-risk schools.

DRAFT – Released for Discussion Purposes Only

DRAFT

- 67 -

JACK M. FLETCHER, Ph.D., is a professor in the Department of Pediatrics at the University of Texas-Houston Health Science Center, and Associate Director, Center for Academic and Reading Skills. For the past 20 years, Dr. Fletcher, a child neuropsychologist, has completed research on many aspects of the development of reading, language, and other cognitive skills in children. He has worked extensively on issues related to learning and attention problems, including definition and classification, neurobiological correlates, and most recently, intervention. He collaborates on several grants on reading and attention, including a multi-disciplinary grant funded by the National Institute of Child Health and Human Development, the U.S. Department of Education, and the National Science Foundation under the Interagency Educational Research Initiative. Dr. Fletcher is also Principal Investigator or Co-Principal Investigator on NIH-funded research projects involving children with brain injuries, including a program project on spina bifida. Dr. Fletcher served on and chaired the NICHD Mental Retardation/Developmental Disabilities study section and is a former member of the NICHD Maternal and Child Health study section. He chaired a committee on children with persistent reading disability for the Houston Independent School District (HISD) and served on a task force on reading for HISD that produced a report widely cited within the state of Texas as a model for enhancing reading instruction in elementary school children. Dr. Fletcher has received several service awards from local school districts. Dr. Fletcher is part of a large consortium of investigators from the University of Houston, University of Texas-Houston, University of Texas-Austin, and California State University-Long Beach who recently received a program project grant involving the development of literacy skills in Spanish-speaking and bilingual children under the recent NICHD/Department of Education Bilingual Research Initiative.

GEORGIA EARNEST GARCÍA is Associate Professor and Associate Head of the Department of Curriculum and Instruction at the University of Illinois at Urbana-Champaign. She holds a zero-time appointment in the Department of Educational Policy Studies and is a faculty affiliate with the Latina/Latinos Studies Program. A former Title VII Bilingual Education Fellow, she obtained her Ph.D. in Education from the University of Illinois in 1988. She currently teaches courses in reading, bilingual education/ESL, sociolinguistics, and multicultural education. Her research focuses on the literacy development, instruction, and assessment of students from culturally, linguistically, and economically diverse backgrounds, with much of her current research focusing on bilingual reading. She has published her work in the *American Educational Research Journal*, *Anthropology and Education Quarterly*, *Review of Research in Education*, *Reading*

DRAFT – Released for Discussion Purposes Only

DRAFT

- 68 -

Research Quarterly, and *Journal of Literacy Research*. She was named a College of Education Distinguished Scholar in 1997, and awarded the Faculty Award for Excellence in Graduate Teaching, Advising, and Research by the Council of Graduate Students in Education in 1993. Dr. García was a Senior Research Scientist at the Center for the Study of Reading for six years. She currently serves on the Board of Directors for the National Reading Conference.

IRENE W. GASKINS, a school administrator and founder of Benchmark School, is above all a teacher and instructional leader. Throughout her career she has been involved in many aspects of reading education. Gaskins taught in the public schools in Virginia and Pennsylvania. In 1965 she received her masters degree in Reading Education from the University of Pennsylvania and became a research assistant in the Reading Clinic there. As a research assistant she tracked the characteristics and progress of struggling readers in Penn's dyslexia study. This experience piqued Gaskins' interest in bright children who have great difficulty learning to read. Her dissertation research addressed this topic. Stints as a district reading consultant, college teacher, and consultant with a publishing company; were followed by Gaskins receiving her doctorate in Educational Psychology in 1970 from the University of Pennsylvania. Sparked by her interest in children who have profound difficulties in learning to read, Irene founded Benchmark School in Media, Pennsylvania in 1970. Gaskins designed Benchmark not only to be a special school for helping struggling readers, but she also wanted it to be a laboratory for designing instruction that works for all students. Collaborating with her energetic and dedicated faculty, as well as major consultants from around the country, Gaskins has worked on such significant problems as designing word recognition instruction that works for students who previously made little progress in this area, improving reading performance by increasing students' awareness and control of cognitive styles and other personal factors that impact on reading, and designing programs that teach strategies for understanding and learning from texts. During the years 1988-1994 the strategies research at Benchmark was funded by the James S. McDonnell Foundation and Benchmark was the Foundation's National Demonstration School. One of the parts of her job that Gaskins likes most is being the teacher, or co-teacher, who pilots and fine tunes the new programs being developed at Benchmark. The results of this work have been published in journals such as *The Reading Teacher*,

Reading Research Quarterly, *Journal of Reading Behavior*, *Language Arts*, *Elementary School Journal*, *Remedial and Special Education*, and *Journal of Learning Disabilities*.

ARTHUR C. GRAESSER is a full professor in the Department of Psychology and an adjunct professor in Mathematical Sciences at The University of Memphis. He is currently a co-director of the Institute for Intelligent Systems and director of the Center for Applied Psychological

DRAFT – Released for Discussion Purposes Only

DRAFT

- 69 -

Research. In 1977 Dr. Graesser received his Ph.D. in psychology from the University of California at San Diego. Dr. Graesser's primary research interests are in cognitive science and discourse processing. More specific interests include knowledge representation, question asking and answering, tutoring, text comprehension, inference generation, conversation, reading, education, memory, expert systems, artificial intelligence, and human-computer interaction. His primary interest in reading focus on deeper levels of comprehension, such as inference generation, questioning, summarization, rhetorical organization, and pragmatics. He is currently editor of the journal *Discourse Processes*, and on the editorial board of *Journal of Educational Psychology*, *Journal of the Scientific Studies of Reading*, *Cognition & Instruction*, *Applied Cognitive Psychology*, *Poetics*, and the *International Journal of Speech Technologies*). In addition to publishing over 200 articles in journals and books, he has written two books and has edited six books.

JOHN GUTHRIE is a professor of Human Development at the University of Maryland at College Park. He received his Ph.D. from the University of Illinois in Educational Psychology. From 1992-1997 he was Co-Director of the National Reading Research Center (NRRC), which conducted studies of skilled reading, writing, and knowledge development. His current research addresses cognitive and motivational processes in learning conceptual knowledge from text among elementary students. Based on this work, he developed an engagement model of classroom context, processes of engagement in reading, and reading outcomes. From the model, he developed Concept-Oriented Reading Instruction (CORI) and conducted quasi-experiments showing that this intervention increases reading comprehension, reading motivation and science knowledge. He has performed structural equation modeling to show that reading engagement (e.g., cognition and motivation) mediated the effects of instruction on reading strategies and knowledge outcomes. His studies are published in peer-reviewed research journals. He currently holds two grants from the National Center for Educational Statistics (NCES) for secondary analyses of NAEP data examining reading instructional effects on reading achievement. He served on the expert panel for the Reading Excellence Act in 1999-2000. He was a member of one National Reading Council (NRC) committee that monitored the development of the Voluntary National Tests, and a second NRC committee that conducted a study of common metrics for reading achievement in 1998-2000.

MICHAEL L. KAMIL is Professor of Education at Stanford University. He is a member of the Psychological Studies in Education Committee and is on the faculty of the Learning, Design, and Technology Program. His research explores the effects of a variety of technologies on literacy and the acquisition of literacy in both first and second languages. He has worked

DRAFT – Released for Discussion Purposes Only

DRAFT

- 70 -

extensively in schools, reading clinics, and other learning environments to determine the appropriate balance between applications of technology and the demands of literacy. One current line of research involves a comparison of processes used by adults in reading hypertext and conventional texts. This work is being extended to similar work with young children. He is also conducting instructional research focusing on the uses of expository text for reading instruction in first and second grade. The results suggest a benefit over other instructional methods that are based almost exclusively in story or narrative text. He is a co-editor of the *Handbook of Reading Research*, Vols. 1, 2, and 3 and has been editor of *Reading Research Quarterly* and *Journal of Reading Behavior*. For the past two years he has been a member of the National Reading Panel, producing a synthesis of instructional research in reading. He chaired the National Reading Panel subgroups working on Comprehension, Technology, and Teacher Education.

WILLIAM NAGY received his PhD in linguistics from the University of California, San Diego. He spent 18 years at the Center for the Study of Reading at the University of Illinois, Urbana-Champaign, and since 1996 has been a professor of education at Seattle Pacific University, where he teaches graduate courses in reading. His interests include vocabulary acquisition and instruction, the role of vocabulary knowledge in first- and second-language reading, and the contributions of metalinguistic awareness to learning to read. His research has focused primarily on incidental word learning from context during reading, bilingual students' recognition of cognate relationships between English and Spanish, the acquisition of English derivational morphology and the role of morphology in word learning and reading comprehension, and the role of morphological awareness in the literacy development of children learning to read in China. He recently contributed a chapter on vocabulary acquisition processes to Volume III of the *Handbook of Reading Research*.

ANNEMARIE SULLIVAN PALINCSAR is the Jean and Charles Walgreen Jr. Chair of Literacy, Associate Dean for Graduate Affairs, and a teacher educator at the University of Michigan in the Educational Studies Department. Her research has focused on the design of learning environments that support self-regulation in learning activity, especially for children who experience difficulty learning in school. Her initial research (with A. Brown) was the design and investigation of reciprocal teaching dialogues to enhance reading comprehension with middle school students. Subsequent research focused on the use of this instruction to introduce primary-grade children to comprehension monitoring as they were learning to read. With co-principal investigator, C.S. Englert, she conducted four years of research, working with special educators, to design literacy curricula and instruction that would engage special education students in using

DRAFT

- 71 -

oral, written, and print literacy to accelerate their literacy learning. In current research, conducted with science educator, S.J. Magnusson, she studies how children use literacy in the context of guided inquiry science instruction, what types of text support children's inquiry, and what support students who are identified as atypical learners require to be successful in this instruction.

Annemarie served as a member of the NRC's Council on the Prevention of Reading Difficulty in Young Children; the National Education Goals Panel, the Schooling Task Force of the MacArthur Pathways Project, and the National Advisory Board to Children's Television Workshop.

***CATHERINE SNOW** is the Henry Lee Shattuck Professor of Education at the Harvard Graduate School of Education. She received her Ph.D. in psychology from McGill and worked for several years in the linguistics department of the University of Amsterdam. Her research interests include children's language development as influenced by interaction with adults in home and preschool settings, literacy development as related to language skills and as influenced by home and school factors, and issues related to the acquisition of English oral and literacy skills by language minority children. She has co-authored books on language development (e.g., *Pragmatic Development* with Anat Ninio) and on literacy development (e.g., *Unfulfilled Expectations: Home and School Influences on Literacy*, with W. Barnes, J. Chandler, I. Goodman & L. Hemphill), and published widely on these topics in refereed journals and edited volumes. Snow's contributions to the field include membership on several journal editorial boards, co-directorship for several years of the Child Language Data Exchange System, and editorship of *Applied Psycholinguistics*. She served as a board member at the Center for Applied Linguistics and a member of the National Research Council Committee on Establishing a Research Agenda on Schooling for Language Minority Children. She chaired the National Research Council Committee on Preventing Reading Difficulties in Young Children, which produced a report that has been widely adopted as a basis for reform of reading instruction and professional development. She currently serves on the NRC's Council for the Behavioral and Social Sciences and Education, and as president of the American Educational Research Association. A member of the National Academy of Education, Snow has held visiting appointments at the University of Cambridge, England, Universidad Autonoma in Madrid, and The Institute of Advanced Studies at Hebrew University in Jerusalem, and has guest taught at Universidad Central de Caracas, El Colegio de Mexico, Odense University in Denmark, and several institutions in The Netherlands.

* RAND Reading Study Group Chair

DRAFT

- 72 -

DOROTHY S. STRICKLAND is the State of New Jersey Professor of Reading at Rutgers University. She is past president of both the International Reading Association and the Reading Hall of Fame. Her research and practice interests include: early literacy learning and teaching in classrooms from preschool through the middle school years; early intervention policy and practice from pre kindergarten through grade three; focused intervention at the upper elementary and middle school levels; and the special needs of low achieving poor and minority children. Current activities related to the work of the Reading Group include membership on several teacher standards boards: National Board for Professional Teaching Standards, Middle Childhood/Generalist Committee; ETS/Praxis Reading National Advisory Committee; INTASC/Council of State School Officers Panel on Reading. She was a panel member of the report, Preventing Reading Difficulties in Young Children and is now working on a funded project to articulate teacher standards from pre kindergarten through grade four with the design and implementation of appropriate and consistent teacher education. Relevant publications include: The Administration and Supervision of Reading Programs; Emerging Literacy, Language, Literacy, and the Child, Teaching Phonics Today, Beginning Reading and Writing, and three chapters in press on classroom intervention for low achieving students, one of which focuses on low-performing African American children.

FRANK R. VELLUTINO is a Professor of Psychology at the University at Albany, State University of New York. He currently holds joint faculty appointments in the Department of Psychology (Cognitive Psychology Program), the Department of Educational and Counseling Psychology, and the Program in Linguistics and Cognitive Science of the Department of Anthropology. He is also Director of the Child Research and Study Center, a research and student training center. He currently teaches a graduate course in children's learning that emphasizes intellectual, perceptual, memory, and language development, as well as a graduate seminar in human development that focuses on the relationship between language and cognitive development. His research has been concerned with the cognitive underpinnings of reading development as well as the relationship between reading difficulties and various aspects of language and other cognitive functions. It has generated numerous articles in refereed journals, in addition to a book, and numerous book chapters addressing the causes and correlates of reading difficulties in young children. Dr. Vellutino's most recent research seeks to develop models of early intervention that effectively reduce the number of children who continue to have long term reading difficulties, and, thereby, further our understanding of reading development.

DRAFT

- 73 -

JOANNA WILLIAMS is Professor of Psychology and Education at Teachers College, Columbia University. She holds an Ed.M. degree from Harvard University and a Ph.D. in experimental psychology from Yale University. Her research interests include the processes involved in beginning reading and in comprehension and reading instruction for students with learning disabilities and other students at risk for school failure. In the late 1970s Dr. Williams developed a program to teach phonemic awareness to students with learning disabilities (*The ABDs of Reading*). Her work has explored differences in the comprehension patterns of normally-developing students and students with learning disabilities, and she has demonstrated a link between the editing difficulties during listening and reading (inability to inhibit competing associations) of students with learning disabilities and their comprehension performance. Recently she developed a program, *The Theme Scheme*, that helps children go beyond plot-level comprehension to a more abstract understanding of story themes and how they to a more abstract understanding of story themes and how they relate to real-life experiences. Dr. Williams has also been active in training and curriculum-development projects related to the professional development of teachers. She was editor of the *Journal of Educational Psychology* from 1973 to 1978, and she is the founding editor of *Scientific Studies of Reading* (1997-). She was a member of the National Reading Panel. Currently she is on the Board of Directors of the Society for the Study of Scientific Reading, a member of the Expert Strategy Panel, U.S. Department of Education--Office of Special Education Programs, and a principal investigator in the Center on Accelerating School Learning.